Environmental Notification Form – Supplemental Memorandum

Northeastern University – Coastal Sustainability Institute

EEA# 16046

July 9, 2019

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(Per MEPA email correspondence dated June 27, 2019)

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1. Description of programming of the CSI including the breakdown of uses and FTE table. The cross section is also a helpful visual.

Narrative:
The following information was provided to MEPA via email on June 26th in response to their emailed request for clarifications on June 25th.

Please note that Northeastern is seeking to permit Scheme B (highlighted in the attached documents). The total square foot (sqft) calculation for this configuration is 55,000 sqft – down from 60,000 in Scheme A. Of the 55,000 sqft, less than 30,000 sqft is for programing – the remaining area is for mechanical and support areas as illustrated in the graphics below.

Complete email correspondence included as Attachment 1.

Northeastern University
Proposed Marine Science Center Expansion
Response to Questions from 12/11/18 Board of Selectmen Meeting

We have received a detailed list of questions about the proposed expansion to the Marine Science Center. The below responses seek to clarify information that may have been misinterpreted or misunderstood.

Because the project remains at an early concept stage, some details will not be available until the design is finalized. However, as the size of the project is a focus of inquiry, and the size of the expansion is directly related to the work that we propose on site, the response below is focused on factors driving the size of the proposed additional square footage.

1. **Who will be working in the new space why do they need 55,000 to 60,000 sq. ft.?**

Personnel Type	Existing	Existing + Proposed*
Faculty (PI)	20	40
Postdocs	11	22
Technicians/Staff	15	30
PhD Students	38	76
Three Seas Program	20	40
Undergraduate Interns	10	20
*Assumes 4.7 FTE per PI	114	228

The Institute would focus its research efforts on three main themes: (1) Global Change Science and Modeling, (2) Security and Sustainability of Coastal Resources, and (3) Environmental Sensing. Faculty will collaborate on a variety of topics ranging from greener shoreline protection strategies and habitat restoration to the genomic signatures of climate change and their impacts on ecologically and commercially important species. This work will take place in 5 research disciplines: (1) Genomics, (2) Ecology and Evolution, (3) Environmental Science, (4) Biogeochemistry and Environmental Chemistry, and (5) Computation.

The table below summarizes net assigned square footage (NASF) for research AND office space for each proposed scheme. Also shown is the NASF (research + office) per new FTE. We use an FTE value of 114 even though new Core Facilities will support all (existing + new) FTE researchers.

	Net Assigned Square Footage		
MURPHY BUNKER ADDITION	**SCHEME A**	**SCHEME B**	**SCHEME C**
Research	**22,990**	**20,130**	**17,470**
	Net NSF per FTE (N = 114)		
	SCHEME A	**SCHEME B**	**SCHEME C**
	201.67	**176.58**	**153.25**
EDWARDS ADDITION	**SCHEME A**	**SCHEME B**	**SCHEME C**
Research	**-**	**-**	**3,740**
	Net NSF per FTE (N = 114)		
	SCHEME A	**SCHEME B**	**SCHEME C**
	-	**-**	**33**
GRAND Total Research NSF	**22,990**	**20,130**	**21,210**
Grand Total Research NSF/FTE	**201.67**	**176.58**	**186.05**

What is the difference between "wet" and "dry" labs?

There has been some confusion regarding what "wet" means in terms of research space. First, one can define biogeochemistry, genomics, and environmental chemistry as "wet" bench work even though seawater is not being delivered to the area. Second, “wet” can refer to active use of seawater in research or teaching labs. We consider biogeochemistry, genomics, and environmental chemistry as "wet" bench work along with the seawater research labs.

What is the expected student population and space needed?

Our proposed student population will comprise 76 PhD students and 40 Masters/undergraduate students. Presently, we have two classrooms (one in Murphy Bunker and one in the trailers) and one small meeting room. We presently have no formal teaching labs. We do the best that we can by leveraging faculty research labs and sea tables to support activities that would be much better served by teaching labs. Our proposed program would result in three classrooms (one that currently exists in Murphy Bunker, and two additional classrooms, the location of which depends on the selected Scheme). Our estimates on square footage per student for teaching assume 116 students. Our estimates for meeting rooms assume a population of 114 added to the 114 already working at the campus.

In general, we expect our courses to cover existing topics (e.g., experimental design and statistics, marine invertebrate zoology and botany, oceanography) and new topics (e.g., biogeochemistry, fisheries science, ecological and evolutionary genomics, coastal dynamics).

The table below summarizes NASF and NASF per FTE for teaching and meeting space. Our calculations assume 116 personnel for teaching and 114 personnel for meetings.

	Net Assigned Square Footage		
MURPHY BUNKER ADDITION	**SCHEME A**	**SCHEME B**	**SCHEME C**
Classrooms	**-**	**1,600**	**-**
Teaching Labs	**2,820**	**2,820**	**1,560**
Meeting Rooms	**3,280**	**1,810**	**1,810**
TOTAL	**6,100**	**6,230**	**3,370**
	Net NSF per FTE		
	SCHEME A	**SCHEME B**	**SCHEME C**
	53.08	**53.98**	**29.33**
EDWARDS ADDITION	**SCHEME A**	**SCHEME B**	**SCHEME C**
Classrooms	**-**	**-**	**1,600**
Teaching Labs	-	-	**1,560**
Meeting Rooms	-	-	-
TOTAL	**-**	**-**	**3,160**
	Net NSF per FTE		
	SCHEME A	**SCHEME B**	**SCHEME C**
	-	**-**	**27.72**
GRAND Total Teaching NASF	**6,100**	**6,230**	**6,530**
Grand Total Teaching NASF/FTE	**53.08**	**53.98**	**57.04**

How many would be seated classroom style, would any be labs, and what kind of labs? What is the ft2 per student in class?

As described above, two new lecture style classrooms are proposed, each designed to serve 20-25 students. The seawater teaching lab and the general use teaching lab are also designed to serve 20-25 students.

Please also account for the stated FAQ number of 20 faculty currently; on the Marine and Environmental Science webpage for NU we could see only 11 tenured/tenure track, 1 research faculty, and 2 part time lecturers.

The faculty working at the Marine Science Center are not solely from Marine and Environmental Sciences (several are also from Civil and Environmental Engineering). Web pages are undergoing revision and should not be used as an indicator of who is actually working at the MSC.

How is the current space used?

Murphy Bunker has 31,083 GSF and 13,202 NASF. The table below summarizes NASF for appropriate categories and NASF/FTE. In all cases existing FTE is 114 except for Grad Student/Postdoc seating in trailer, where existing FTE = 49. In all calculations, lab space and office space in support of research are summed together. We view the greenhouse (NASF = 1,445) as a special research resource and do not calculate NASF/FTE.

EXISTING FACILITIES	Murphy Bunker			Edwards Building			Trailers	
	NSF	per FTE		NSF	per FTE		NSF	per FTE
Research	6,776	59.44		8,563	75.11		1,714	34.98
Teaching and Meeting	1,945	17.06		222	1.95		796	6.98
Admin and Support	-	-		695	6.10		-	-
Storage	4,481	39.31		200	1.75		-	-
TOTAL	13,202	115.81		9,680	84.91		2,510	41.96

What is the expected difference between peak population and average daily population?

A peak day would translate to 228 people. It is more difficult to determine an average day. Our current peak population is 114 people. On average, 20-30 people use the MSC shuttle per day, so we estimate our average daily current population to be 60 to 70 people. The proposed doubling of our program suggests that 120 to 140 people would be present on an average day.

What about a cafeteria? Auditorium? Conference Center?

There will be no café or food retail space of any kind. We have programmed two small kitchenettes, as is typical for these facilities. There is no auditorium planned. Scheme A does have flexible classroom space with movable partitions creating a flex classroom / meeting space for approximately 50 people. We are not planning a conference center for our Nahant campus. By “convening experts,” we do not mean doing so under the mantle of a conference as implied above. Any conference style activities would take place on the Boston campus, which was the case when we held our Urban Coastal Sustainability Conference in 2012.

Do current MSC tenure/tenure track faculty teach only on Nahant or do they also teach elsewhere?

Professors do the majority of their teaching on the Boston Campus.

Why is a uniform 1300 ft2 per faculty used?

This is not a uniform calculation. Please see personnel and program breakdowns above.

What are anticipated traffic and parking impacts?

The initial traffic study was undertaken in early November 2018 during perceived normalized traffic patterns. This was done so summer beach traffic would not dilute the percentage of traffic ultimately destined for the Marine Science Center. Northeastern has agreed to work with the Town to perform two additional studies in the spring and summer to further develop these assessments.

As currently calculated, the traffic entering the Marine Science Center gate represents only 2% of the traffic arriving or departing Nahant at the causeway. We anticipate that this number will be smaller during the spring and summer studies. Northeastern would like to reduce the available parking on site as much as possible. We are willing to consider alternative solutions such as shuttles from the Boston Campus or offsite parking facilities such as the Wonderland Station lots to further reduce required parking on site. No parking structure is being considered.

The evolution of the Urban Coastal Sustainability Initiative

The evolution of the Urban Coastal Sustainability Initiative, launched in 2012, into the Coastal Sustainability Institute has been a long and complex process. Until formal planning for a new research facility began in January 2017, much of our efforts were driven by internal factors that had to be resolved before formal discussions began with the Town. This being said, several general conversations with former Town Manager Jeff Chelgren took place, including Geoff Trussell and John Tobin attending the October 4, 2016 Board of Selectmen's Meeting. COS Dean Murray Gibson and Director Geoff Trussell also met with Susan Solomon to discuss our goals on June 27, 2013. At that time, she did not raise the community concerns outlined in this document. At that time, our thinking was still very much in the conceptual phase but we did discuss adding to our research infrastructure in Nahant to support the initiative.

MSC and university researchers collaborate with a variety of scientists and researchers who are not based at the Boston or Nahant campuses. These kinds of collaborations occur without the need to be "place-based." The Nahant campus operates on a different premise than the Burlington campus, which is focused on national security, defense, homeland security, and resilience research that is meant to be co-located and collaborative with government and industry partners. Any comparison between Burlington and Nahant is inapt.

Why has NU MSC not removed obsolete piping to prevent ongoing industrial pollution of our local environment? If it is not obsolete, why has NU apparently doubled up the use of the pipes?

What is the status of existing and proposed seawater pipes at the campus?

The new pipes were installed as part of the 2012 upgrade and the original pipes were meant to provide a backup system during routine maintenance on the new pipes. Unfortunately, the old pipes soon became inoperable in part because of excessive biofouling and have been dormant for quite some time. None of the pipes have delivered or are delivering "industrial pollution." A permit is required to remove the old pipes and our intent is to perform this operation when installation of the proposed new system occurs.

In the Payette plans, how much of the building is on top of as opposed to nestled below ground against the existing bunker?

Scheme A: 33,000 GSF above bunker (East) – 27,000 GSF partially buried (East)

Scheme B: 37,000 GSF above bunker (17,650 on East and 19,350 on West) – 18,000 fully buried (East)

Scheme C: 28,650 GSF above bunker (17,650 on East and 11,000 on West) – 15,300 fully buried

13,000 GSF New Building behind Edwards

How will the goals for screening and removal of invasive species be accomplished?

Selection of appropriate plant species will be based on the landscape architect's considerable experience with coastal environments. New plantings will be specified of sufficient maturity to endure environmental conditions. Consideration will be made as to the time of year of initial planting to permit sufficient growth prior to harsh winter conditions. Plantings which fail to take hold or die after initial planting will be removed and replaced as part of a broader invasive species management plan. Species selection must also promote meaningful site restoration and enhance wildlife habitat that will serve to increase species diversity on-site.

What has been the basis for ecological analysis of the site?

The purpose of the ecological analysis of the project area has been undertaken to document existing vegetation communities, habitat cover types, wildlife habitat features, and wildlife habitat utilization. We plan to continue to gather information and listen to the public to aid in a project design and development that avoids, minimizes, and mitigates potential impacts to wildlife and wildlife habitat. The project will implement Best Management Practices during construction which will include consideration of scheduling of certain site activities during known nesting seasons. Compliance with all Environmental Permits during construction will require continued monitoring of work occurring nearby wetlands and coastal zones mitigating impact to wildlife within those protected areas.

How might Northeastern and Nahant strengthen a mutually beneficial partnership as part of this building project?

We would like to work with the Selectmen and the Town to ensure the project's implementation mitigates project impacts and the end result is a project and program shared with the Town.

How will the project mitigate and improve marine conditions for lobstermen?

Various regulatory agencies – such as the Division of Marine Fisheries, the Environmental Protection Agency, and the Department of Environmental Protection have determined that our current and proposed system are negligible in terms of temperature and habitat effects. This conclusion is also supported by a 35+ year long-term monitoring study of benthic habitats inside and outside of Shag Rocks that delineate the southern end of Bathing Beach Cove.

We have proposed to collaborate with local lobstermen to establish and operate a lobster hatchery. Our intent is to operate the hatchery indefinitely and to forge a strong partnership with local lobstermen, as is the case for researchers and fishers in Maine. The costs of constructing the hatchery would be supported by the project and annual operation would be supported by the Institute's operating budget. We are grateful to the lobstermen that have raised many important issues (e.g., the potential thermal effects of our discharge system) and the data we have collected since March 2018 indicate reveal that thermal impacts are negligible.

Why build on the Bunker instead of just around Edwards?

As noted in the December 11th presentation, the Edwards building is not structurally capable of accommodating additional floors and site constraints do not allow for meeting the full program on that part of the site. In fact, the option including Edwards (Scheme C) uses the greatest amount of land area of all of the options.

NU states that the seawater temperature was monitored at the outflow and elsewhere, and determined that there was no effect on the surrounding water temperature. Were those measurements taken in winter or summer, and does the season matter? When and in what form will the measurements be made publicly available?

Measurements were taken continuously from March to December 2018 at various locations requested by the regulatory agencies. NU plans on including these data in the Notice of Intent.

If baby lobsters are being killed (macerated per G. Trussell) by the seawater system at present, as NU stated, what else is being affected? Has the habitat been altered in such a way that the added baby lobsters would not survive long enough to grow to harvestable size? What about the impact of other creatures in the ecosystem? How does the idea of replacing killed lobsters with lab-grown ones mesh with the ideals of a coastal sustainability institute in your view?

Various regulatory agencies – such as the Division of Marine Fisheries, the Environmental Protection Agency, and the Department of Environmental Protection have determined that the effects of our proposed system are negligible in terms of temperature and habitat effects. Our initial calculations of lobsters ultimately lost from the system was based on a flow rate of 2,400 gallons per minutes and a value of 43.7 larvae per 1,000 m^3 of seawater (the highest value we

could find in the literature). This translates into 102,927 larvae lost per year. Estimated survival of lobsters from egg to market size is between .004 to .02%, suggesting that a loss of 102,927 larvae would result in a loss of, at most, 21 market sized lobsters after the 5-8 year growth interval. Our revised intake rate of 600 gallons per minute would translate into 25,732 lobster larvae, or 5 market sized lobsters, being lost from the system. Our proposal to build a hatchery that produces 90,000 Stage IV larvae that have a survival rate of ~.05% would translate into 45 market sized lobsters being added to the system per year. We see this solution as significant enhancement to the fishery that, when coupled with the positive environmental implications of our research activities, is consistent with our sustainability mission.

How many square feet would a hatchery require? Where would it be and what would it look like?

We have not finalized design of the hatchery but do not expect it to require more than 500 square feet. It would be housed within the existing south gunport of Murphy Bunker.

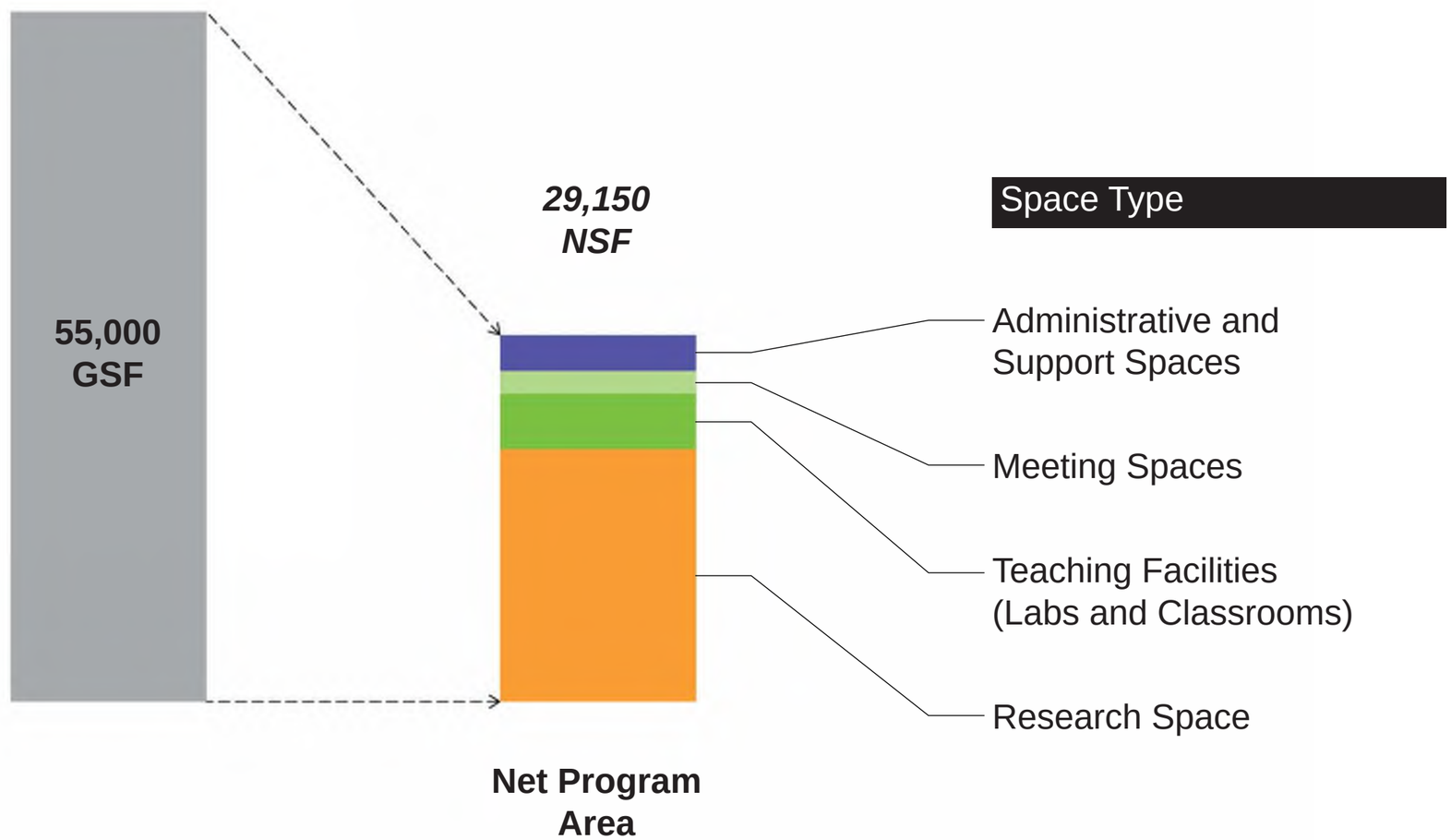
What is the town's assurance that promises made to the town about the project would be binding and not change? *And would you also provide a binding assurance that you would attempt no further building?*

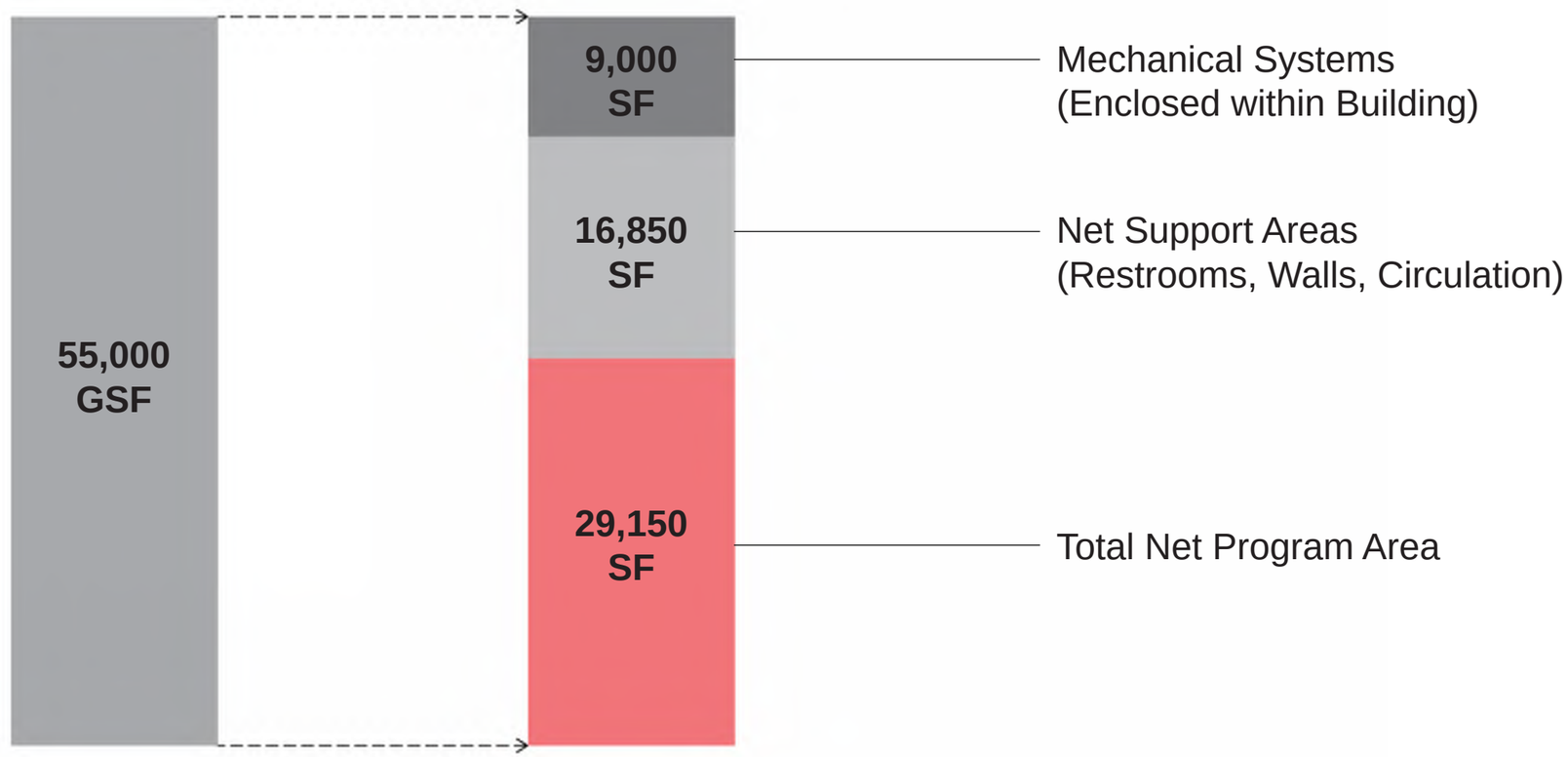
We would be willing to discuss restrictions (beyond the contemplated additions) that would limit further construction to improvements or replacements for buildings and structures that are already established.

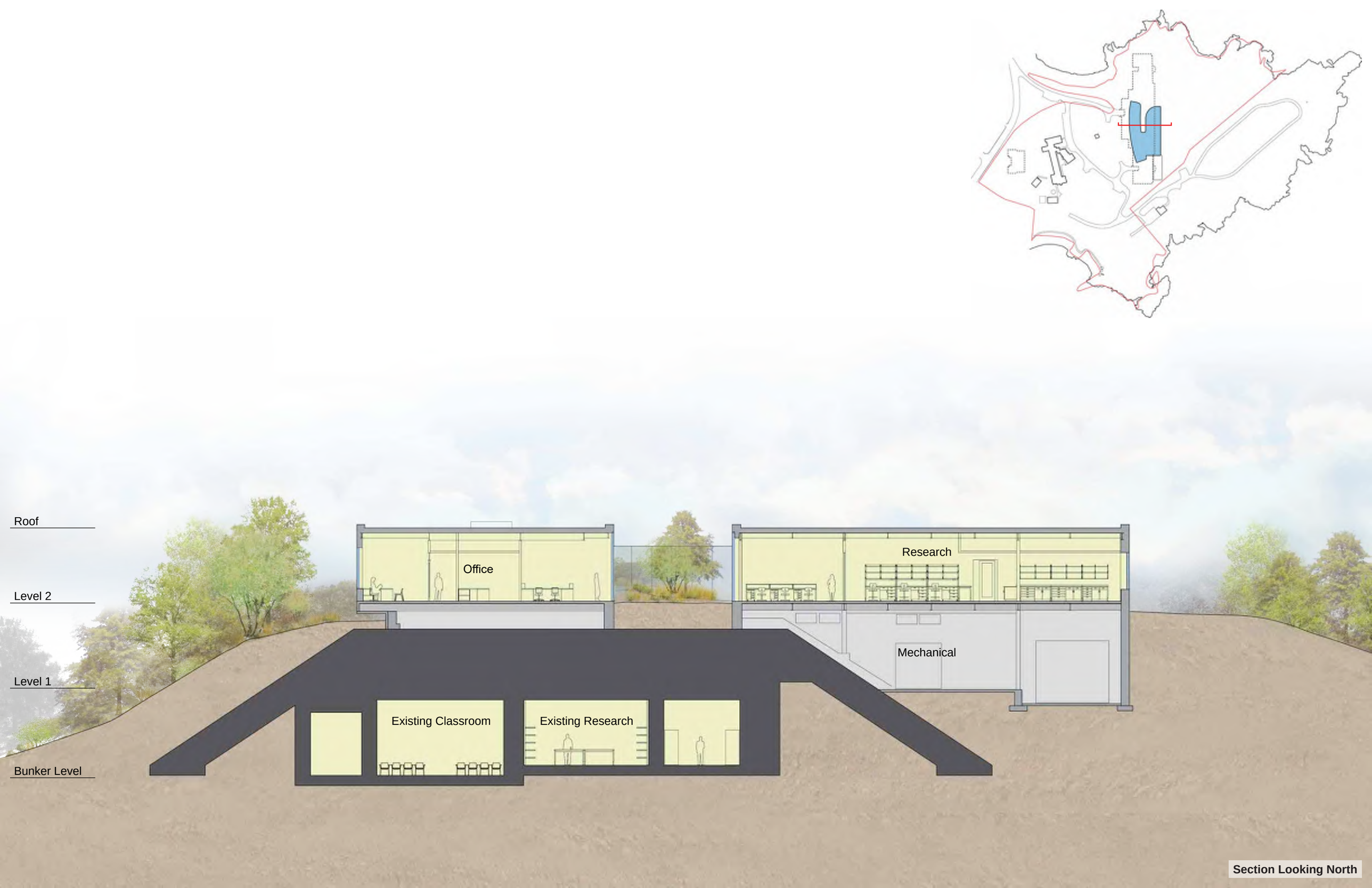
Coastal communities face numerous threats posed by extreme weather and sea level rise, collapsing fisheries, invasive species, and coastal pollution. The mission of the Coastal Sustainability Institute is to create new knowledge and develop innovative solutions that promote cleaner, safer and smarter coastal communities. Together, the Marine Science Center and Nahant are on the front line of these threats, creating a compelling opportunity to effectively leverage the interdisciplinary expertise of scientists, engineers and policy makers to solve these major challenges now and in the future. We believe that Nahant's location at the epicenter of these challenges and Northeastern's commitment to use-inspired research will create a legacy of knowledge that benefits coastal communities here and around the world.

Northeastern University

Coastal Sustainability Institute
Marine Science Center


55,000
GSF
29,150
NSF
Net Program
Area
Space Type
Administrative and
Support Spaces
Meeting Spaces
Teaching Facilities
(Labs and Classrooms)
Research Space

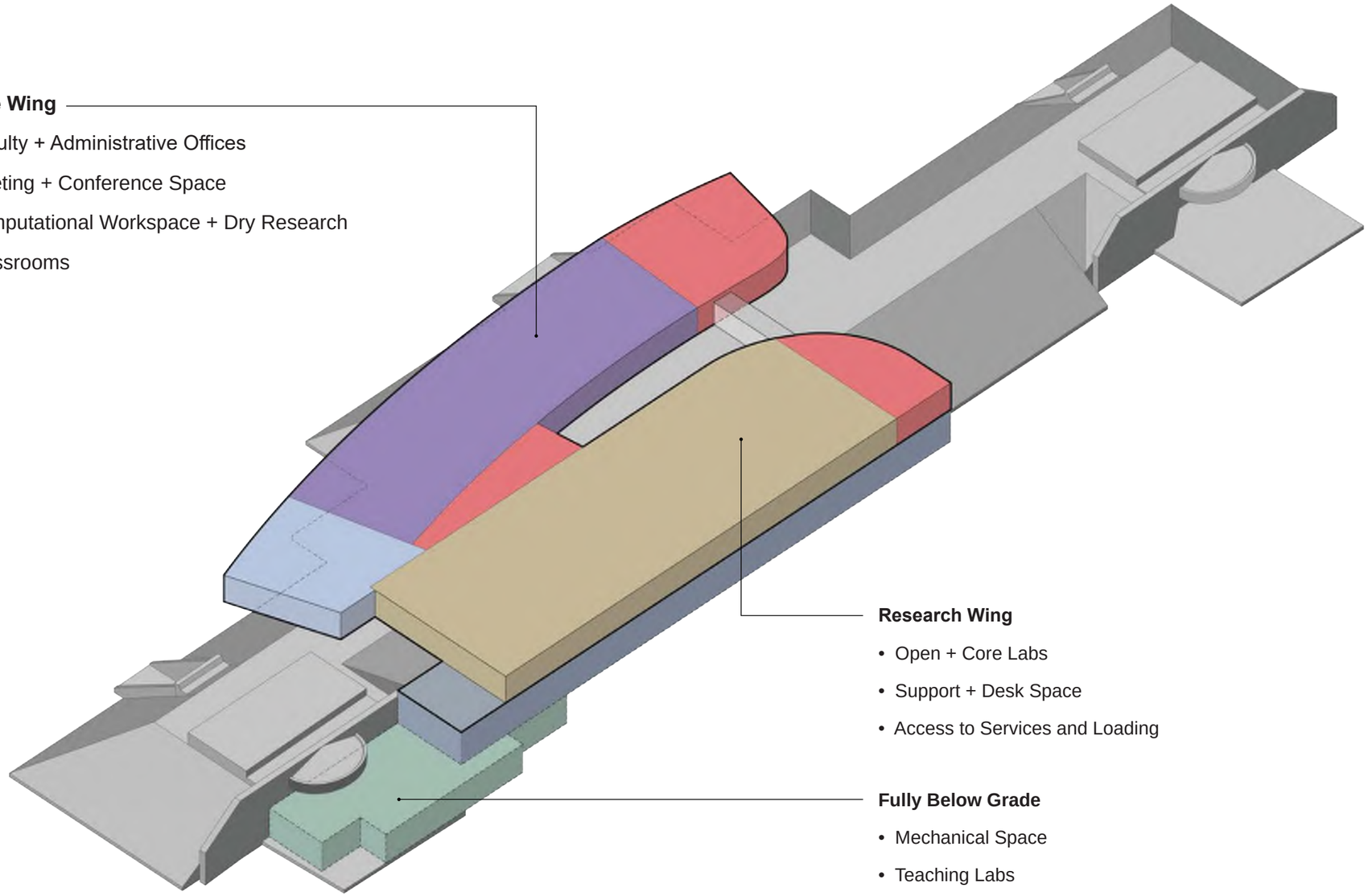

55,000
GSF
9,000
SF
16,850
SF
29,150
SF
Mechanical Systems
(Enclosed within Building)
Net Support Areas
(Restrooms, Walls, Circulation)
Total Net Program Area



Section Looking North

Office Wing

- Faculty + Administrative Offices
- Meeting + Conference Space
- Computational Workspace + Dry Research
- Classrooms



Research Wing

- Open + Core Labs
- Support + Desk Space
- Access to Services and Loading

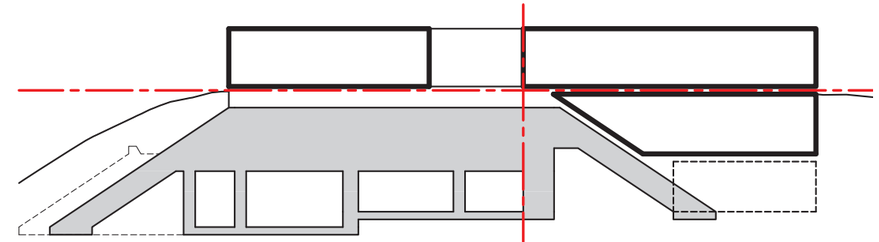
Fully Below Grade

- Mechanical Space
- Teaching Labs
- Seawater Program

Floor Area Above Bunker
37,000 GSF

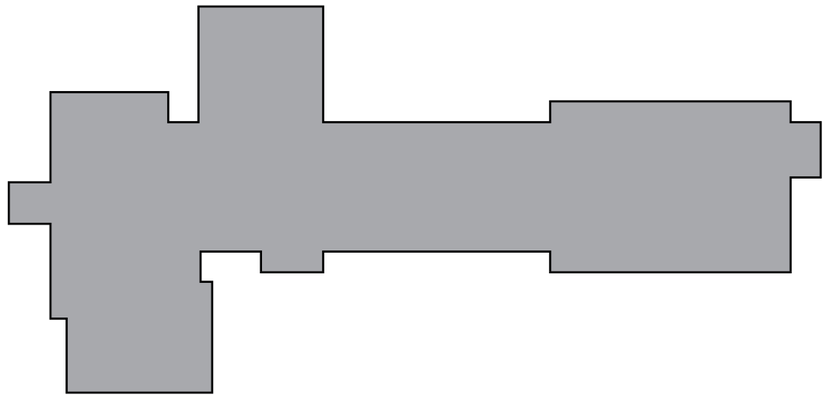
West (Above Bunker)
19,350 GSF

East (Above Bunker)
17,650 GSF



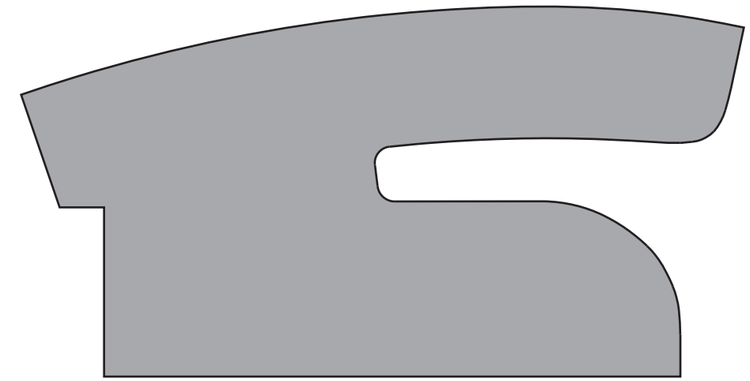
East (Fully Buried)
18,000 GSF

Total: 55,000 GSF



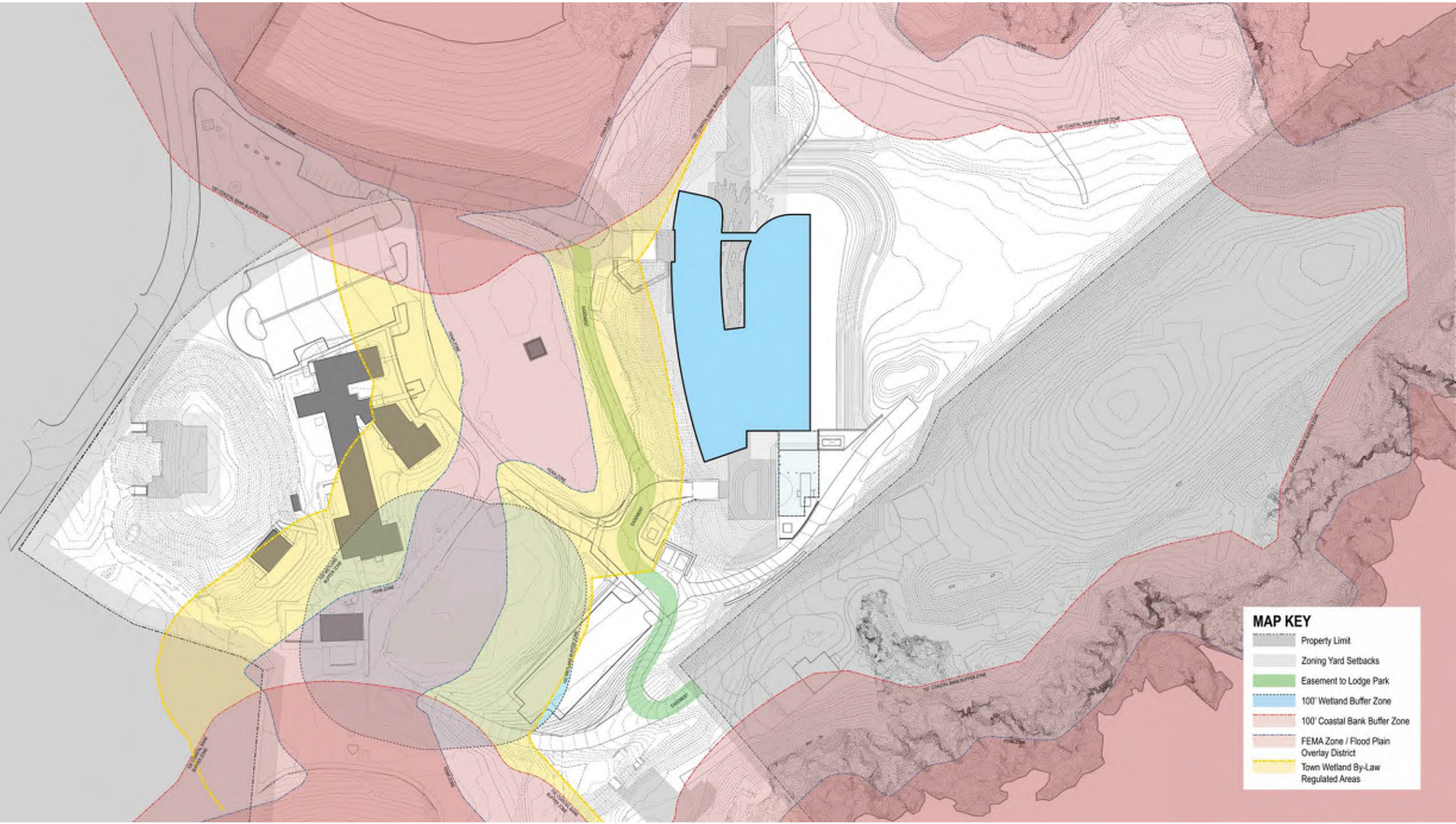
Johnson Elementary School

Building Footprint:	27,450 SF
2 stories above grade	
Floor Area Above Grade:	**41,069 SF**
Basement Area:	0 SF
Building Gross Area:	41,069 SF



Coastal Sustainability Institute

Building Footprint:	37,000 SF
1 story above grade	
Floor Area Above Grade:	**37,000 SF**
Basement Area:	18,000 SF
Building Gross Area:	55,000 SF


MAP KEY
Property Limit
Zoning Yard Setbacks
Easement to Lodge Park
100' Wetland Buffer Zone
100' Coastal Bank Buffer Zone
FEMA Zone / Flood Plain Overlay District
Town Wetland By-Law Regulated Areas

Campus View

Lodge Park View | Winter

Lodge Park View | Summer

2. Additional Traffic Information

Narrative:
The following information related to the additional traffic studies was provided to MEPA via email dated Thursday June 27th. The attachments include data obtained from the ATRs (Automatic Traffic Recorder) from the second round of traffic recordings conducted June 3-4 2019 and a memorandum summarizing the results of the study. Results from the initial traffic study conducted in the fall of 2018 were included in the ENF filing.

Summary of June Traffic Study:
In November, the ADT volume at Location 3 (Marine Science Center Gate) was 2.2% of the volume at Location 1 (causeway) and 10.3% of the volume at Location 2 (Nahant Town Hall). In June, those percentages dropped to 1.9% and 8.9%, respectively.

Nitsch Engineering

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www.nitscheng.com

MEMORANDUM

TO: Tim MacKay

FROM: Bryan Zimolka, PE, ENV SP
Adina Alpert, PE, PTOE

DATE: June 26, 2019

RE: Northeastern University Marine Science Center, Nahant – Traffic Count Evaluation

This memorandum is a follow-up to our Preliminary Traffic Impact Study, dated December 5, 2018. In that study, we evaluated existing conditions near the site of the Northeastern University Marine Science Center ("Campus"), located at 430 Nahant Road in Nahant. It included 48-hour continuous Automatic Traffic Recorder (ATR) traffic counts collected Wednesday, November 7, 2018 to Thursday, November 8, 2018 at three locations:

- Nahant Road, south of Wilson Road (near the Causeway);
- Nahant Road, west of Pleasant Street (near Nahant Town Hall and Public Library); and
- Nahant Road, west of Northeastern Driveway (Campus entrance).

We assumed there is seasonal variation in traffic volumes within Nahant due to the beach and recreational facilities that draw more traffic in warmer months. However, we assume there is no such seasonal effect on traffic accessing Campus, which is assumed to be affected instead by the University's academic calendar. To evaluate the seasonal effect on traffic volumes in Nahant, we obtained a second set of traffic counts to compare the previous late-autumn traffic data with new data from late spring. Precision Data Industries, LLC (PDI) collected new 48-hour continuous ATR counts at the same three locations from Monday, June 3, 2019 to Tuesday, June 4, 2019. Both the previous counts and the new counts were obtained during regular school sessions.

For both the November and June sets of traffic count data, the counts from each day in the 48-hour period were averaged to yield Average Daily Traffic (ADT) volumes. Neither data set was seasonally adjusted, preserving the seasonal differences between the data sets.

Table 1 summarizes the traffic volume data for November 2018, and Table 2 summarizes the traffic volume data for June 2019.

Table 1 – Traffic Volume Summary: November 2018

ATR No.	ATR Location	Period	ADT[a]		Peak Hour Traffic			K Factor[d]
			Volumes (vpd)[b]	Directional Distribution	Period	Volumes (vph)[c]	Directional Distribution	
1	Nahant Road, south of Wilson Road	Weekday	7,922	50.3% NB	Morning	588	71% NB	0.07
					Evening	615	53% SB	0.08
2	Nahant Road, west of Pleasant Street	Weekday	1,697	51.6% EB	Morning	147	51% EB	0.09
					Evening	151	51% WB	0.09
3	Nahant Road, west of Northeastern Driveway	Weekday	175	50.3% WB	Morning	30	88% EB	0.17
					Evening	22	100% WB	0.12

[a] Average Daily Traffic; [b] Vehicles per day; [c] Vehicles per hour; [d] Proportion of daily traffic

Table 2 – Traffic Volume Summary: June 2019

ATR No.	ATR Location	Period	ADT[a]		Peak Hour Traffic				K Factor[d]
			Volumes (vpd)[b]	Directional Distribution	Period	Volumes (vph)[c]	Directional Distribution		
1	Nahant Road, south of Wilson Road	Weekday	9,178	EQUAL	Morning	617	67%	NB	0.07
					Evening	677	63%	SB	0.07
2	Nahant Road, west of Pleasant Street	Weekday	1,969	52.8% EB	Morning	142	50%	EB	0.07
					Evening	176	50%	WB	0.09
3	Nahant Road, west of Northeastern Driveway	Weekday	176	50.1% WB	Morning	33	85%	EB	0.19
					Evening	18	97%	WB	0.10

[a] Average Daily Traffic; [b] Vehicles per day; [c] Vehicles per hour; [d] Proportion of daily traffic

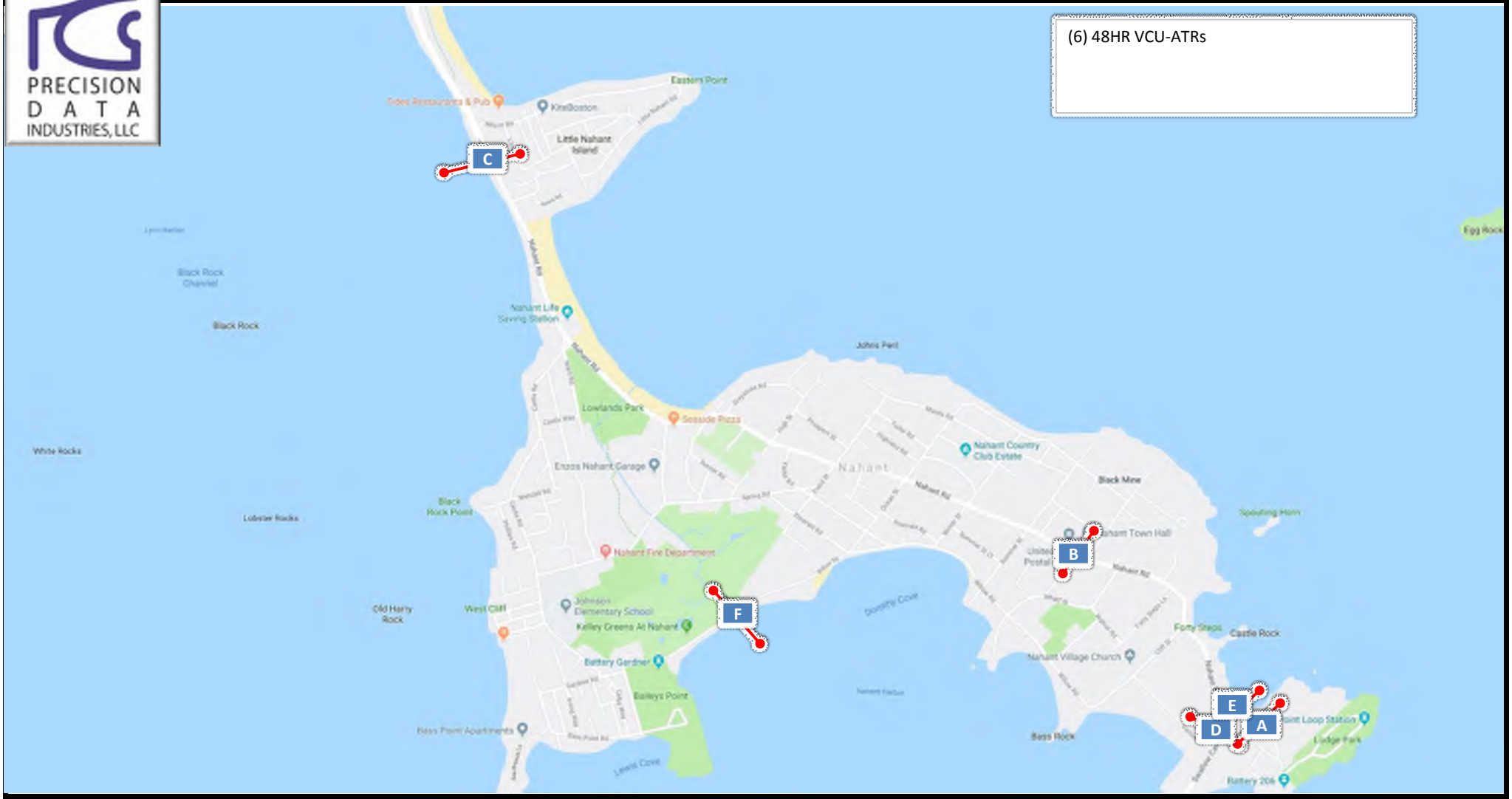
At both ATR Location 1 and ATR Location 2, ADT volumes were approximately 16% higher in the June count than the November count. At ATR Location 3, the Campus entrance, the ADT volume was nearly the same in both count periods.

Morning peak-hour volumes increased in June at Location 1 by 5%, decreased at Location 2 by 3%, and increased at Location 3 by 10% relative to November volumes. Evening peak-hour volumes increased by 10% at Location 1, increased by 17% at Location 2, and decreased by 18% at Location 3. Directional distribution percentages were similar in June to those in November for daily and peak-hour volumes, with peak directions remaining the same, except that the daily directional distribution at Location 1 was exactly equal between northbound and southbound in the June counts where it had been 50.3% northbound in the November counts.

In November, the ADT volume at Location 3 was 2.2% of the volume at Location 1 and 10.3% of the volume at Location 2. In June, those percentages dropped to 1.9% and 8.9%, respectively. Though the ADT volume at the Campus access point remained nearly the same between the counts, the percentage of traffic at other locations that it represents decreased in June relative to November, presumably due to the higher volume of beach and recreational traffic in other areas of Nahant.

Location Map: 196989 Nahant, MA

Precision Data Industries, LLC 46 Morton Street, Framingham, MA 01702 ph: 508-875-0100 email: datarequests@pdillc.com



Client:	Engineer:	Site Code:	Date:	PDI Job #	City, State:
Nitsch	B. Zimolka	12125.2	Mon 6/3 thru Tues 6/4/2019	196989	Nahant, MA

Nahant Road
east of Parking Area at Gate
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 A Volume
Site Code: TBA

Start	EB				WB				Combined				06/03/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Mon
12:00	0		2		0		1		0		3		
12:15	0		2		0		0		0		2		
12:30	0		1		0		1		0		2		
12:45	0	0	2	7	0	0	1	3	0	0	3	10	
01:00	0		0		1		1		1		1		
01:15	0		0		0		1		0		1		
01:30	0		2		0		2		0		4		
01:45	0	0	1	3	0	1	0	4	0	1	1	7	
02:00	0		1		0		4		0		5		
02:15	0		1		0		1		0		2		
02:30	0		3		0		4		0		7		
02:45	0	0	0	5	0	0	2	11	0	0	2	16	
03:00	0		0		0		4		0		4		
03:15	0		0		0		1		0		1		
03:30	0		1		0		3		0		4		
03:45	0	0	1	2	0	0	2	10	0	0	3	12	
04:00	0		1		0		3		0		4		
04:15	0		0		0		5		0		5		
04:30	0		1		0		3		0		4		
04:45	0	0	0	2	0	0	3	14	0	0	3	16	
05:00	0		0		0		6		0		6		
05:15	0		0		0		6		0		6		
05:30	0		0		0		1		0		1		
05:45	1	1	0	0	0	0	1	14	1	1	1	14	
06:00	0		0		1		1		1		1		
06:15	0		0		0		2		0		2		
06:30	0		0		0		1		0		1		
06:45	0	0	2	2	0	1	2	6	0	1	4	8	
07:00	0		0		0		2		0		2		
07:15	1		0		0		1		1		1		
07:30	2		1		0		0		2		1		
07:45	4	7	0	1	0	0	0	3	4	7	0	4	
08:00	4		0		0		0		4		0		
08:15	7		0		2		1		9		1		
08:30	6		0		3		0		9		0		
08:45	9	26	0	0	0	5	1	2	9	31	1	2	
09:00	10		0		1		0		11		0		
09:15	2		0		2		1		4		1		
09:30	5		1		1		0		6		1		
09:45	5	22	0	1	3	7	0	1	8	29	0	2	
10:00	0		0		0		0		0		0		
10:15	5		0		4		0		9		0		
10:30	3		0		3		0		6		0		
10:45	1	9	0	0	1	8	0	0	2	17	0	0	
11:00	0		0		0		0		0		0		
11:15	2		0		1		0		3		0		
11:30	1		0		0		0		1		0		
11:45	1	4	0	0	2	3	0	0	3	7	0	0	
Total	69		23		25		68		94		91		
Percent	73.4%		25.3%		26.6%		74.7%						
Day Total		92				93				185			
Peak	08:15	-	12:00	-	09:45	-	04:30	-	08:15	-	04:30	-	- -
Vol.	32	-	7	-	10	-	18	-	38	-	19	-	- -
P.H.F.	0.800		0.875		0.625		0.750		0.864		0.792		

Nahant Road
east of Parking Area at Gate
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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196989 A Volume
Site Code: TBA

Start	EB				WB				Combined				06/04/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	0		1		0		1		0		2		
12:15	0		4		0		1		0		5		
12:30	0		1		0		1		0		2		
12:45	0	0	1	7	0	0	5	8	0	0	6	15	
01:00	0		2		0		3		0		5		
01:15	0		1		0		3		0		4		
01:30	0		1		0		0		0		1		
01:45	0	0	2	6	0	0	4	10	0	0	6	16	
02:00	0		3		0		1		0		4		
02:15	0		1		0		0		0		1		
02:30	0		1		0		3		0		4		
02:45	0	0	2	7	0	0	3	7	0	0	5	14	
03:00	0		1		0		3		0		4		
03:15	0		0		0		2		0		2		
03:30	0		1		0		5		0		6		
03:45	0	0	1	3	0	0	1	11	0	0	2	14	
04:00	0		1		0		7		0		8		
04:15	0		1		0		0		0		1		
04:30	0		0		0		5		0		5		
04:45	0	0	1	3	0	0	2	14	0	0	3	17	
05:00	0		0		0		4		0		4		
05:15	0		0		0		5		0		5		
05:30	0		0		1		2		1		2		
05:45	1	1	0	0	0	1	0	11	1	2	0	11	
06:00	0		0		1		0		1		0		
06:15	0		0		0		3		0		3		
06:30	0		0		0		1		0		1		
06:45	0	0	0	0	0	1	1	5	0	1	1	5	
07:00	1		0		0		2		1		2		
07:15	1		0		1		0		2		0		
07:30	0		1		0		0		0		1		
07:45	3	5	0	1	0	1	0	2	3	6	0	3	
08:00	2		0		1		0		3		0		
08:15	7		1		1		0		8		1		
08:30	8		0		1		0		9		0		
08:45	9	26	0	1	1	4	0	0	10	30	0	1	
09:00	1		0		0		0		1		0		
09:15	5		0		1		0		6		0		
09:30	1		1		0		0		1		1		
09:45	5	12	0	1	1	2	0	0	6	14	0	1	
10:00	2		0		1		0		3		0		
10:15	2		0		1		1		3		1		
10:30	1		0		1		0		2		0		
10:45	1	6	0	0	0	3	0	1	1	9	0	1	
11:00	0		0		1		0		1		0		
11:15	1		0		0		0		1		0		
11:30	2		0		0		0		2		0		
11:45	1	4	0	0	1	2	0	0	2	6	0	0	
Total	54		29		14		69		68		98		
Percent	79.4%		29.6%		20.6%		70.4%						
Day Total		83				83				166			
Peak	08:00	-	00:15	-	08:00	-	04:30	-	08:00	-	00:15	-	- -
Vol.	26	-	8	-	4	-	16	-	30	-	18	-	- -
P.H.F.	0.722		0.500		1.000		0.571		0.750		0.750		

Nahant Road
east of Parking Area at Gate
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196989 A Class
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EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
08:00	25	1	0	0	0	0	0	0	0	0	0	0	0	26
09:00	21	1	0	0	0	0	0	0	0	0	0	0	0	22
10:00	8	1	0	0	0	0	0	0	0	0	0	0	0	9
11:00	3	1	0	0	0	0	0	0	0	0	0	0	0	4
12 PM	7	0	0	0	0	0	0	0	0	0	0	0	0	7
13:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
14:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
15:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
16:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	2	0	0	0	0	0	0	0	0	0	0	0	2
19:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	86	6	0	0	0	0	0	0	0	0	0	0	0	92
Percent	93.5%	6.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00												08:00
Vol.	25	1												26
PM Peak	12:00	18:00												12:00
Vol.	7	2												7

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EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	4	1	0	0	0	0	0	0	0	0	0	0	0	5
08:00	25	1	0	0	0	0	0	0	0	0	0	0	0	26
09:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
10:00	4	2	0	0	0	0	0	0	0	0	0	0	0	6
11:00	3	1	0	0	0	0	0	0	0	0	0	0	0	4
12 PM	7	0	0	0	0	0	0	0	0	0	0	0	0	7
13:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
14:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
15:00	2	1	0	0	0	0	0	0	0	0	0	0	0	3
16:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
20:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
21:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	77	6	0	0	0	0	0	0	0	0	0	0	0	83
Percent	92.8%	7.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	10:00												08:00
Vol.	25	2												26
PM Peak	12:00	15:00												12:00
Vol.	7	1												7

Nahant Road
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WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
09:00	6	1	0	0	0	0	0	0	0	0	0	0	0	7
10:00	7	1	0	0	0	0	0	0	0	0	0	0	0	8
11:00	2	1	0	0	0	0	0	0	0	0	0	0	0	3
12 PM	3	0	0	0	0	0	0	0	0	0	0	0	0	3
13:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
14:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
15:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
16:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
17:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
18:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
19:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
20:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
21:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	90	3	0	0	0	0	0	0	0	0	0	0	0	93
Percent	96.8%	3.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	09:00												10:00
Vol.	7	1												8
PM Peak	16:00													16:00
Vol.	14													14

Nahant Road
east of Parking Area at Gate
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WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
07:00	0	1	0	0	0	0	0	0	0	0	0	0	0	1
08:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
09:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
10:00	1	2	0	0	0	0	0	0	0	0	0	0	0	3
11:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
12 PM	8	0	0	0	0	0	0	0	0	0	0	0	0	8
13:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
14:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
15:00	10	1	0	0	0	0	0	0	0	0	0	0	0	11
16:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
17:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
18:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
19:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	78	5	0	0	0	0	0	0	0	0	0	0	0	83
Percent	94.0%	6.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	10:00												08:00
Vol.	4	2												4
PM Peak	16:00	13:00												16:00
Vol.	14	1												14

Nahant Road
west of Pleasant Street
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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196989 B Volume
Site Code: TBA

Start	EB				WB				Combined				06/03/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Mon
12:00	4		28		1		20		5		48		
12:15	1		21		0		16		1		37		
12:30	2		19		0		18		2		37		
12:45	1	8	23	91	0	1	12	66	1	9	35	157	
01:00	0		16		1		17		1		33		
01:15	1		14		1		13		2		27		
01:30	0		21		1		17		1		38		
01:45	0	1	25	76	1	4	24	71	1	5	49	147	
02:00	1		18		1		19		2		37		
02:15	0		22		0		23		0		45		
02:30	1		22		0		17		1		39		
02:45	0	2	24	86	1	2	19	78	1	4	43	164	
03:00	0		28		0		28		0		56		
03:15	0		15		0		18		0		33		
03:30	0		24		0		16		0		40		
03:45	1	1	16	83	1	1	26	88	2	2	42	171	
04:00	1		16		0		17		1		33		
04:15	0		22		1		24		1		46		
04:30	0		12		1		18		1		30		
04:45	0	1	14	64	1	3	17	76	1	4	31	140	
05:00	1		21		1		14		2		35		
05:15	0		12		3		15		3		27		
05:30	1		15		3		8		4		23		
05:45	2	4	15	63	8	15	7	44	10	19	22	107	
06:00	3		17		7		6		10		23		
06:15	4		13		8		11		12		24		
06:30	6		15		12		8		18		23		
06:45	8	21	15	60	15	42	9	34	23	63	24	94	
07:00	11		12		16		16		27		28		
07:15	9		26		10		15		19		41		
07:30	14		19		11		6		25		25		
07:45	15	49	13	70	17	54	6	43	32	103	19	113	
08:00	11		16		11		8		22		24		
08:15	12		9		17		5		29		14		
08:30	15		6		14		3		29		9		
08:45	24	62	3	34	12	54	9	25	36	116	12	59	
09:00	21		8		26		2		47		10		
09:15	16		13		12		2		28		15		
09:30	16		10		19		4		35		14		
09:45	14	67	2	33	19	76	3	11	33	143	5	44	
10:00	19		3		18		3		37		6		
10:15	17		2		13		0		30		2		
10:30	14		2		17		1		31		3		
10:45	16	66	1	8	13	61	2	6	29	127	3	14	
11:00	19		3		11		1		30		4		
11:15	18		4		14		2		32		6		
11:30	22		1		24		1		46		2		
11:45	24	83	1	9	16	65	1	5	40	148	2	14	
Total	365		677		378		547		743		1224		
Percent	49.1%		55.3%		50.9%		44.7%						
Day Total		1042				925				1967			
Peak	11:00	-	02:15	-	09:00	-	03:00	-	11:00	-	02:15	-	- -
Vol.	83	-	96	-	76	-	88	-	148	-	183	-	- -
P.H.F.	0.865		0.857		0.731		0.786		0.787		0.817		

Nahant Road
west of Pleasant Street
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 B Volume
Site Code: TBA

Start	EB				WB				Combined				06/04/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	1		16		1		12		2		28		
12:15	1		17		0		13		1		30		
12:30	0		24		1		32		1		56		
12:45	1	3	17	74	0	2	21	78	1	5	38	152	
01:00	1		16		0		17		1		33		
01:15	0		15		1		23		1		38		
01:30	0		13		0		8		0		21		
01:45	1	2	23	67	0	1	16	64	1	3	39	131	
02:00	1		22		0		17		1		39		
02:15	1		15		1		8		2		23		
02:30	1		20		0		17		1		37		
02:45	0	3	19	76	0	1	17	59	0	4	36	135	
03:00	1		19		0		20		1		39		
03:15	0		20		0		17		0		37		
03:30	0		24		1		27		1		51		
03:45	0	1	27	90	0	1	27	91	0	2	54	181	
04:00	0		22		3		17		3		39		
04:15	0		20		1		12		1		32		
04:30	1		21		1		18		2		39		
04:45	1	2	15	78	1	6	15	62	2	8	30	140	
05:00	1		19		0		18		1		37		
05:15	1		15		5		14		6		29		
05:30	0		18		7		15		7		33		
05:45	2	4	15	67	5	17	7	54	7	21	22	121	
06:00	2		12		7		13		9		25		
06:15	3		10		11		18		14		28		
06:30	6		15		7		6		13		21		
06:45	13	24	25	62	15	40	13	50	28	64	38	112	
07:00	7		14		12		12		19		26		
07:15	10		22		22		9		32		31		
07:30	5		18		10		11		15		29		
07:45	12	34	18	72	18	62	9	41	30	96	27	113	
08:00	14		13		22		9		36		22		
08:15	15		11		11		6		26		17		
08:30	19		15		16		10		35		25		
08:45	18	66	12	51	16	65	7	32	34	131	19	83	
09:00	15		12		16		5		31		17		
09:15	18		9		16		3		34		12		
09:30	20		8		16		2		36		10		
09:45	20	73	3	32	20	68	3	13	40	141	6	45	
10:00	15		7		16		4		31		11		
10:15	19		3		10		4		29		7		
10:30	17		2		17		4		34		6		
10:45	17	68	2	14	14	57	1	13	31	125	3	27	
11:00	16		4		14		1		30		5		
11:15	15		6		11		1		26		7		
11:30	14		2		13		1		27		3		
11:45	17	62	2	14	13	51	1	4	30	113	3	18	
Total	342		697		371		561		713		1258		
Percent	48.0%		55.4%		52.0%		44.6%						
Day Total		1039				932				1971			
Peak	09:30	-	03:15	-	07:15	-	00:30	-	09:00	-	03:00	-	- -
Vol.	74	-	93	-	72	-	93	-	141	-	181	-	- -
P.H.F.	0.925		0.861		0.818		0.727		0.881		0.838		

Nahant Road
west of Pleasant Street
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 B Class
Site Code: TBA

EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	8	0	0	0	0	0	0	0	0	0	0	0	0	8
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
05:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
06:00	19	2	0	0	0	0	0	0	0	0	0	0	0	21
07:00	44	2	3	0	0	0	0	0	0	0	0	0	0	49
08:00	59	2	1	0	0	0	0	0	0	0	0	0	0	62
09:00	63	2	2	0	0	0	0	0	0	0	0	0	0	67
10:00	62	3	1	0	0	0	0	0	0	0	0	0	0	66
11:00	82	1	0	0	0	0	0	0	0	0	0	0	0	83
12 PM	89	1	1	0	0	0	0	0	0	0	0	0	0	91
13:00	75	0	1	0	0	0	0	0	0	0	0	0	0	76
14:00	85	1	0	0	0	0	0	0	0	0	0	0	0	86
15:00	80	2	1	0	0	0	0	0	0	0	0	0	0	83
16:00	63	1	0	0	0	0	0	0	0	0	0	0	0	64
17:00	62	1	0	0	0	0	0	0	0	0	0	0	0	63
18:00	57	3	0	0	0	0	0	0	0	0	0	0	0	60
19:00	70	0	0	0	0	0	0	0	0	0	0	0	0	70
20:00	34	0	0	0	0	0	0	0	0	0	0	0	0	34
21:00	31	2	0	0	0	0	0	0	0	0	0	0	0	33
22:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
23:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
Total	1009	23	10	0	0	0	0	0	0	0	0	0	0	1042
Percent	96.8%	2.2%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	10:00	07:00											11:00
Vol.	82	3	3											83
PM Peak	12:00	18:00	12:00											12:00
Vol.	89	3	1											91

Nahant Road
west of Pleasant Street
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 B Class
Site Code: TBA

EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/19	3	0	0	0	0	0	0	0	0	0	0	0	0	3
01:00	1	1	0	0	0	0	0	0	0	0	0	0	0	2
02:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
05:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
06:00	24	0	0	0	0	0	0	0	0	0	0	0	0	24
07:00	32	2	0	0	0	0	0	0	0	0	0	0	0	34
08:00	64	2	0	0	0	0	0	0	0	0	0	0	0	66
09:00	71	2	0	0	0	0	0	0	0	0	0	0	0	73
10:00	63	5	0	0	0	0	0	0	0	0	0	0	0	68
11:00	60	2	0	0	0	0	0	0	0	0	0	0	0	62
12 PM	71	2	1	0	0	0	0	0	0	0	0	0	0	74
13:00	67	0	0	0	0	0	0	0	0	0	0	0	0	67
14:00	75	0	1	0	0	0	0	0	0	0	0	0	0	76
15:00	89	1	0	0	0	0	0	0	0	0	0	0	0	90
16:00	78	0	0	0	0	0	0	0	0	0	0	0	0	78
17:00	65	2	0	0	0	0	0	0	0	0	0	0	0	67
18:00	62	0	0	0	0	0	0	0	0	0	0	0	0	62
19:00	72	0	0	0	0	0	0	0	0	0	0	0	0	72
20:00	51	0	0	0	0	0	0	0	0	0	0	0	0	51
21:00	32	0	0	0	0	0	0	0	0	0	0	0	0	32
22:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
23:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
Total	1018	19	2	0	0	0	0	0	0	0	0	0	0	1039
Percent	98.0%	1.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	10:00												09:00
Vol.	71	5												73
PM Peak	15:00	12:00	12:00											15:00
Vol.	89	2	1											90

Nahant Road
west of Pleasant Street
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 B Class
Site Code: TBA

WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
02:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
05:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
06:00	40	2	0	0	0	0	0	0	0	0	0	0	0	42
07:00	52	2	0	0	0	0	0	0	0	0	0	0	0	54
08:00	51	3	0	0	0	0	0	0	0	0	0	0	0	54
09:00	75	1	0	0	0	0	0	0	0	0	0	0	0	76
10:00	56	5	0	0	0	0	0	0	0	0	0	0	0	61
11:00	60	5	0	0	0	0	0	0	0	0	0	0	0	65
12 PM	65	1	0	0	0	0	0	0	0	0	0	0	0	66
13:00	68	1	2	0	0	0	0	0	0	0	0	0	0	71
14:00	75	3	0	0	0	0	0	0	0	0	0	0	0	78
15:00	84	4	0	0	0	0	0	0	0	0	0	0	0	88
16:00	75	1	0	0	0	0	0	0	0	0	0	0	0	76
17:00	43	1	0	0	0	0	0	0	0	0	0	0	0	44
18:00	32	2	0	0	0	0	0	0	0	0	0	0	0	34
19:00	40	3	0	0	0	0	0	0	0	0	0	0	0	43
20:00	25	0	0	0	0	0	0	0	0	0	0	0	0	25
21:00	10	1	0	0	0	0	0	0	0	0	0	0	0	11
22:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
23:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	888	35	2	0	0	0	0	0	0	0	0	0	0	925
Percent	96.0%	3.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	10:00												09:00
Vol.	75	5												76
PM Peak	15:00	15:00	13:00											15:00
Vol.	84	4	2											88

Nahant Road
west of Pleasant Street
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Email: datarequests@pdillc.com

196989 B Class
Site Code: TBA

WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	2	0	0	0	0	0	0	0	0	0	0	0	0	2
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	4	1	1	0	0	0	0	0	0	0	0	0	0	6
05:00	17	0	0	0	0	0	0	0	0	0	0	0	0	17
06:00	38	2	0	0	0	0	0	0	0	0	0	0	0	40
07:00	59	3	0	0	0	0	0	0	0	0	0	0	0	62
08:00	63	2	0	0	0	0	0	0	0	0	0	0	0	65
09:00	64	3	1	0	0	0	0	0	0	0	0	0	0	68
10:00	52	5	0	0	0	0	0	0	0	0	0	0	0	57
11:00	50	1	0	0	0	0	0	0	0	0	0	0	0	51
12 PM	76	1	1	0	0	0	0	0	0	0	0	0	0	78
13:00	59	5	0	0	0	0	0	0	0	0	0	0	0	64
14:00	54	4	1	0	0	0	0	0	0	0	0	0	0	59
15:00	88	3	0	0	0	0	0	0	0	0	0	0	0	91
16:00	62	0	0	0	0	0	0	0	0	0	0	0	0	62
17:00	51	3	0	0	0	0	0	0	0	0	0	0	0	54
18:00	48	2	0	0	0	0	0	0	0	0	0	0	0	50
19:00	41	0	0	0	0	0	0	0	0	0	0	0	0	41
20:00	32	0	0	0	0	0	0	0	0	0	0	0	0	32
21:00	13	0	0	0	0	0	0	0	0	0	0	0	0	13
22:00	13	0	0	0	0	0	0	0	0	0	0	0	0	13
23:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	893	35	4	0	0	0	0	0	0	0	0	0	0	932
Percent	95.8%	3.8%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	09:00	10:00	04:00											09:00
Vol.	64	5	1											68
PM Peak	15:00	13:00	12:00											15:00
Vol.	88	5	1											91

Nahant Road
south of Wilson Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 C Volume
Site Code: TBA

Start	NB				SB				Combined				06/03/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Mon
12:00	7		89		8		102		15		191		
12:15	4		65		9		90		13		155		
12:30	0		67		5		70		5		137		
12:45	0	11	71	292	5	27	82	344	5	38	153	636	
01:00	4		94		3		65		7		159		
01:15	3		70		5		67		8		137		
01:30	5		83		6		91		11		174		
01:45	2	14	79	326	0	14	74	297	2	28	153	623	
02:00	2		87		1		80		3		167		
02:15	2		65		2		79		4		144		
02:30	0		79		3		88		3		167		
02:45	4	8	73	304	0	6	89	336	4	14	162	640	
03:00	2		72		0		89		2		161		
03:15	1		66		1		84		2		150		
03:30	3		74		0		96		3		170		
03:45	5	11	72	284	1	2	92	361	6	13	164	645	
04:00	8		83		4		96		12		179		
04:15	3		59		3		95		6		154		
04:30	6		76		3		93		9		169		
04:45	23	40	70	288	5	15	113	397	28	55	183	685	
05:00	17		64		4		97		21		161		
05:15	35		66		4		118		39		184		
05:30	30		54		7		109		37		163		
05:45	55	137	47	231	10	25	91	415	65	162	138	646	
06:00	51		37		17		97		68		134		
06:15	87		55		15		107		102		162		
06:30	82		45		25		94		107		139		
06:45	79	299	46	183	32	89	89	387	111	388	135	570	
07:00	88		92		32		81		120		173		
07:15	108		51		49		81		157		132		
07:30	113		54		42		70		155		124		
07:45	111	420	56	253	53	176	81	313	164	596	137	566	
08:00	104		51		47		60		151		111		
08:15	70		51		60		70		130		121		
08:30	77		30		50		39		127		69		
08:45	94	345	18	150	55	212	49	218	149	557	67	368	
09:00	85		31		57		56		142		87		
09:15	65		15		43		46		108		61		
09:30	67		17		46		36		113		53		
09:45	76	293	20	83	68	214	21	159	144	507	41	242	
10:00	77		15		60		24		137		39		
10:15	76		12		62		11		138		23		
10:30	75		9		58		30		133		39		
10:45	57	285	9	45	72	252	26	91	129	537	35	136	
11:00	76		18		64		28		140		46		
11:15	67		11		66		16		133		27		
11:30	87		8		72		18		159		26		
11:45	73	303	7	44	60	262	8	70	133	565	15	114	
Total	2166		2483		1294		3388		3460		5871		
Percent	62.6%		42.3%		37.4%		57.7%						
Day Total		4649				4682				9331			
Peak	07:15	-	01:00	-	10:45	-	04:45	-	07:15	-	04:30	-	- -
Vol.	436	-	326	-	274	-	437	-	627	-	697	-	- -
P.H.F.	0.965		0.867		0.951		0.926		0.956		0.947		

Nahant Road
south of Wilson Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 C Volume
Site Code: TBA

Start	NB				SB				Combined				06/04/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	9		60		10		59		19		119		
12:15	6		77		6		74		12		151		
12:30	4		64		7		67		11		131		
12:45	5	24	58	259	5	28	69	269	10	52	127	528	
01:00	1		96		3		51		4		147		
01:15	5		65		9		72		14		137		
01:30	8		54		4		67		12		121		
01:45	3	17	62	277	5	21	88	278	8	38	150	555	
02:00	5		68		6		74		11		142		
02:15	3		78		2		84		5		162		
02:30	3		86		5		75		8		161		
02:45	1	12	79	311	2	15	81	314	3	27	160	625	
03:00	4		70		5		85		9		155		
03:15	2		73		1		83		3		156		
03:30	5		69		1		82		6		151		
03:45	3	14	67	279	3	10	98	348	6	24	165	627	
04:00	14		72		4		80		18		152		
04:15	4		57		4		87		8		144		
04:30	15		49		6		94		21		143		
04:45	17	50	59	237	2	16	105	366	19	66	164	603	
05:00	20		66		8		107		28		173		
05:15	50		63		1		91		51		154		
05:30	37		65		10		107		47		172		
05:45	47	154	52	246	12	31	104	409	59	185	156	655	
06:00	42		58		15		85		57		143		
06:15	89		59		25		112		114		171		
06:30	70		54		18		87		88		141		
06:45	79	280	31	202	32	90	96	380	111	370	127	582	
07:00	101		59		36		98		137		157		
07:15	92		56		39		60		131		116		
07:30	121		54		37		73		158		127		
07:45	106	420	45	214	60	172	63	294	166	592	108	508	
08:00	93		41		58		67		151		108		
08:15	98		39		41		55		139		94		
08:30	78		26		45		71		123		97		
08:45	80	349	22	128	55	199	52	245	135	548	74	373	
09:00	66		28		56		39		122		67		
09:15	83		19		39		52		122		71		
09:30	88		23		44		36		132		59		
09:45	89	326	18	88	64	203	30	157	153	529	48	245	
10:00	82		17		58		28		140		45		
10:15	76		21		73		23		149		44		
10:30	57		10		62		14		119		24		
10:45	68	283	3	51	58	251	11	76	126	534	14	127	
11:00	75		10		55		29		130		39		
11:15	72		6		52		23		124		29		
11:30	59		12		67		10		126		22		
11:45	68	274	6	34	76	250	12	74	144	524	18	108	
Total	2203		2326		1286		3210		3489		5536		
Percent	63.1%		42.0%		36.9%		58.0%						
Day Total		4529				4496				9025			
Peak	07:00	-	02:15	-	09:45	-	04:45	-	07:30	-	04:45	-	- -
Vol.	420	-	313	-	257	-	410	-	614	-	663	-	- -
P.H.F.	0.868		0.910		0.880		0.958		0.925		0.958		

Nahant Road
south of Wilson Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
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Email: datarequests@pdillc.com

196989 C Class
Site Code: TBA

NB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/1														
9	11	0	0	0	0	0	0	0	0	0	0	0	0	11
01:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
02:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
03:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
04:00	40	0	0	0	0	0	0	0	0	0	0	0	0	40
05:00	136	1	0	0	0	0	0	0	0	0	0	0	0	137
06:00	294	5	0	0	0	0	0	0	0	0	0	0	0	299
07:00	409	11	0	0	0	0	0	0	0	0	0	0	0	420
08:00	338	7	0	0	0	0	0	0	0	0	0	0	0	345
09:00	282	10	1	0	0	0	0	0	0	0	0	0	0	293
10:00	273	11	1	0	0	0	0	0	0	0	0	0	0	285
11:00	293	8	2	0	0	0	0	0	0	0	0	0	0	303
12 PM	276	15	1	0	0	0	0	0	0	0	0	0	0	292
13:00	308	14	4	0	0	0	0	0	0	0	0	0	0	326
14:00	278	24	2	0	0	0	0	0	0	0	0	0	0	304
15:00	266	17	1	0	0	0	0	0	0	0	0	0	0	284
16:00	273	14	1	0	0	0	0	0	0	0	0	0	0	288
17:00	215	16	0	0	0	0	0	0	0	0	0	0	0	231
18:00	176	7	0	0	0	0	0	0	0	0	0	0	0	183
19:00	248	5	0	0	0	0	0	0	0	0	0	0	0	253
20:00	145	2	3	0	0	0	0	0	0	0	0	0	0	150
21:00	76	7	0	0	0	0	0	0	0	0	0	0	0	83
22:00	40	5	0	0	0	0	0	0	0	0	0	0	0	45
23:00	38	6	0	0	0	0	0	0	0	0	0	0	0	44
Total	4448	185	16	0	0	0	0	0	0	0	0	0	0	4649
Percent	95.7%	4.0%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	07:00	11:00											07:00
Vol.	409	11	2											420
PM Peak	13:00	14:00	13:00											13:00
Vol.	308	24	4											326

Nahant Road
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196989 C Class
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NB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	17	7	0	0	0	0	0	0	0	0	0	0	0	24
01:00	10	7	0	0	0	0	0	0	0	0	0	0	0	17
02:00	5	7	0	0	0	0	0	0	0	0	0	0	0	12
03:00	12	1	1	0	0	0	0	0	0	0	0	0	0	14
04:00	39	8	3	0	0	0	0	0	0	0	0	0	0	50
05:00	151	3	0	0	0	0	0	0	0	0	0	0	0	154
06:00	275	5	0	0	0	0	0	0	0	0	0	0	0	280
07:00	413	6	1	0	0	0	0	0	0	0	0	0	0	420
08:00	342	7	0	0	0	0	0	0	0	0	0	0	0	349
09:00	319	7	0	0	0	0	0	0	0	0	0	0	0	326
10:00	271	10	2	0	0	0	0	0	0	0	0	0	0	283
11:00	257	17	0	0	0	0	0	0	0	0	0	0	0	274
12 PM	248	10	1	0	0	0	0	0	0	0	0	0	0	259
13:00	266	11	0	0	0	0	0	0	0	0	0	0	0	277
14:00	296	14	1	0	0	0	0	0	0	0	0	0	0	311
15:00	271	8	0	0	0	0	0	0	0	0	0	0	0	279
16:00	232	4	1	0	0	0	0	0	0	0	0	0	0	237
17:00	239	5	2	0	0	0	0	0	0	0	0	0	0	246
18:00	197	5	0	0	0	0	0	0	0	0	0	0	0	202
19:00	212	2	0	0	0	0	0	0	0	0	0	0	0	214
20:00	126	1	1	0	0	0	0	0	0	0	0	0	0	128
21:00	88	0	0	0	0	0	0	0	0	0	0	0	0	88
22:00	49	2	0	0	0	0	0	0	0	0	0	0	0	51
23:00	33	1	0	0	0	0	0	0	0	0	0	0	0	34
Total	4368	148	13	0	0	0	0	0	0	0	0	0	0	4529
Percent	96.4%	3.3%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	07:00	11:00	04:00											07:00
Vol.	413	17	3											420
PM Peak	14:00	14:00	17:00											14:00
Vol.	296	14	2											311

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196989 C Class
Site Code: TBA

SB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/1														
9	27	0	0	0	0	0	0	0	0	0	0	0	0	27
01:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
02:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
03:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:00	14	1	0	0	0	0	0	0	0	0	0	0	0	15
05:00	25	0	0	0	0	0	0	0	0	0	0	0	0	25
06:00	82	7	0	0	0	0	0	0	0	0	0	0	0	89
07:00	159	13	4	0	0	0	0	0	0	0	0	0	0	176
08:00	205	6	1	0	0	0	0	0	0	0	0	0	0	212
09:00	202	11	1	0	0	0	0	0	0	0	0	0	0	214
10:00	233	15	4	0	0	0	0	0	0	0	0	0	0	252
11:00	251	11	0	0	0	0	0	0	0	0	0	0	0	262
12 PM	328	15	1	0	0	0	0	0	0	0	0	0	0	344
13:00	279	15	3	0	0	0	0	0	0	0	0	0	0	297
14:00	316	20	0	0	0	0	0	0	0	0	0	0	0	336
15:00	350	11	0	0	0	0	0	0	0	0	0	0	0	361
16:00	388	9	0	0	0	0	0	0	0	0	0	0	0	397
17:00	402	12	1	0	0	0	0	0	0	0	0	0	0	415
18:00	383	4	0	0	0	0	0	0	0	0	0	0	0	387
19:00	306	6	1	0	0	0	0	0	0	0	0	0	0	313
20:00	211	7	0	0	0	0	0	0	0	0	0	0	0	218
21:00	152	6	1	0	0	0	0	0	0	0	0	0	0	159
22:00	85	6	0	0	0	0	0	0	0	0	0	0	0	91
23:00	63	7	0	0	0	0	0	0	0	0	0	0	0	70
Total	4483	182	17	0	0	0	0	0	0	0	0	0	0	4682
Percent	95.7%	3.9%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	10:00	07:00											11:00
Vol.	251	15	4											262
PM Peak	17:00	14:00	13:00											17:00
Vol.	402	20	3											415

Nahant Road
south of Wilson Road
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196989 C Class
Site Code: TBA

SB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	24	2	2	0	0	0	0	0	0	0	0	0	0	28
01:00	13	8	0	0	0	0	0	0	0	0	0	0	0	21
02:00	5	10	0	0	0	0	0	0	0	0	0	0	0	15
03:00	6	4	0	0	0	0	0	0	0	0	0	0	0	10
04:00	15	1	0	0	0	0	0	0	0	0	0	0	0	16
05:00	30	0	1	0	0	0	0	0	0	0	0	0	0	31
06:00	86	4	0	0	0	0	0	0	0	0	0	0	0	90
07:00	155	12	5	0	0	0	0	0	0	0	0	0	0	172
08:00	191	8	0	0	0	0	0	0	0	0	0	0	0	199
09:00	193	10	0	0	0	0	0	0	0	0	0	0	0	203
10:00	237	13	1	0	0	0	0	0	0	0	0	0	0	251
11:00	233	17	0	0	0	0	0	0	0	0	0	0	0	250
12 PM	263	5	1	0	0	0	0	0	0	0	0	0	0	269
13:00	265	13	0	0	0	0	0	0	0	0	0	0	0	278
14:00	301	13	0	0	0	0	0	0	0	0	0	0	0	314
15:00	339	8	1	0	0	0	0	0	0	0	0	0	0	348
16:00	364	2	0	0	0	0	0	0	0	0	0	0	0	366
17:00	406	3	0	0	0	0	0	0	0	0	0	0	0	409
18:00	376	4	0	0	0	0	0	0	0	0	0	0	0	380
19:00	294	0	0	0	0	0	0	0	0	0	0	0	0	294
20:00	244	1	0	0	0	0	0	0	0	0	0	0	0	245
21:00	157	0	0	0	0	0	0	0	0	0	0	0	0	157
22:00	75	1	0	0	0	0	0	0	0	0	0	0	0	76
23:00	73	1	0	0	0	0	0	0	0	0	0	0	0	74
Total	4345	140	11	0	0	0	0	0	0	0	0	0	0	4496
Percent	96.6%	3.1%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	11:00	07:00											10:00
Vol.	237	17	5											251
PM Peak	17:00	13:00	12:00											17:00
Vol.	406	13	1											409

Swallow Cave Road
south of Nahant Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Office: 508-875-0100 Fax: 508-875-0118
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196989 D Volume
Site Code: TBA

Start	NB				SB				Combined				06/03/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Mon
12:00	0		2		0		6		0		8		
12:15	0		6		0		8		0		14		
12:30	0		2		1		3		1		5		
12:45	0	0	3	13	0	1	6	23	0	1	9	36	
01:00	0		0		0		3		0		3		
01:15	0		2		0		4		0		6		
01:30	1		8		0		1		1		9		
01:45	0	1	9	19	0	0	6	14	0	1	15	33	
02:00	0		3		0		5		0		8		
02:15	0		3		0		2		0		5		
02:30	0		7		0		10		0		17		
02:45	0	0	5	18	0	0	7	24	0	0	12	42	
03:00	0		4		0		8		0		12		
03:15	0		6		0		4		0		10		
03:30	0		3		0		9		0		12		
03:45	0	0	8	21	0	0	5	26	0	0	13	47	
04:00	0		3		0		6		0		9		
04:15	0		5		0		3		0		8		
04:30	0		3		0		3		0		6		
04:45	0	0	4	15	0	0	4	16	0	0	8	31	
05:00	0		4		0		6		0		10		
05:15	0		4		0		1		0		5		
05:30	2		3		0		1		2		4		
05:45	1	3	0	11	1	1	1	9	2	4	1	20	
06:00	0		3		1		1		1		4		
06:15	0		1		0		4		0		5		
06:30	0		3		3		2		3		5		
06:45	0	0	1	8	0	4	3	10	0	4	4	18	
07:00	2		3		1		4		3		7		
07:15	0		3		2		5		2		8		
07:30	1		2		0		7		1		9		
07:45	1	4	1	9	1	4	4	20	2	8	5	29	
08:00	0		0		0		1		0		1		
08:15	4		2		0		2		4		4		
08:30	2		1		0		3		2		4		
08:45	3	9	3	6	4	4	1	7	7	13	4	13	
09:00	3		0		2		2		5		2		
09:15	1		0		4		3		5		3		
09:30	3		1		2		2		5		3		
09:45	1	8	0	1	2	10	2	9	3	18	2	10	
10:00	2		0		4		0		6		0		
10:15	3		0		5		1		8		1		
10:30	2		0		5		1		7		1		
10:45	1	8	0	0	2	16	1	3	3	24	1	3	
11:00	1		0		5		1		6		1		
11:15	3		0		2		1		5		1		
11:30	6		1		4		1		10		2		
11:45	2	12	1	2	3	14	0	3	5	26	1	5	
Total	45		123		54		164		99		287		
Percent	45.5%		42.9%		54.5%		57.1%						
Day Total		168				218				386			
Peak	08:15	-	01:30	-	10:15	-	02:30	-	11:00	-	02:30	-	- -
Vol.	12	-	23	-	17	-	29	-	26	-	51	-	- -
P.H.F.	0.750		0.639		0.850		0.725		0.650		0.750		

Swallow Cave Road
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Client: Nitsch/ B. Zimolka

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196989 D Volume
Site Code: TBA

Start	NB				SB				Combined				06/04/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	0		3		0		4		0		7		
12:15	0		2		1		4		1		6		
12:30	0		6		0		6		0		12		
12:45	0	0	4	15	0	1	2	16	0	1	6	31	
01:00	1		4		1		4		2		8		
01:15	0		4		0		5		0		9		
01:30	0		1		0		1		0		2		
01:45	0	1	5	14	0	1	3	13	0	2	8	27	
02:00	0		2		1		9		1		11		
02:15	0		2		1		3		1		5		
02:30	0		1		0		3		0		4		
02:45	0	0	4	9	0	2	8	23	0	2	12	32	
03:00	0		7		1		3		1		10		
03:15	0		7		0		4		0		11		
03:30	1		5		0		5		1		10		
03:45	0	1	4	23	0	1	5	17	0	2	9	40	
04:00	0		0		0		3		0		3		
04:15	1		2		0		3		1		5		
04:30	0		6		0		7		0		13		
04:45	1	2	2	10	0	0	2	15	1	2	4	25	
05:00	0		6		0		6		0		12		
05:15	0		2		1		4		1		6		
05:30	3		7		0		7		3		14		
05:45	0	3	0	15	0	1	1	18	0	4	1	33	
06:00	1		2		1		5		2		7		
06:15	1		2		0		2		1		4		
06:30	0		4		2		5		2		9		
06:45	1	3	2	10	1	4	3	15	2	7	5	25	
07:00	1		2		0		4		1		6		
07:15	0		6		3		5		3		11		
07:30	1		1		0		2		1		3		
07:45	1	3	2	11	1	4	5	16	2	7	7	27	
08:00	1		3		1		2		2		5		
08:15	0		3		0		4		0		7		
08:30	2		1		1		1		3		2		
08:45	0	3	1	8	1	3	2	9	1	6	3	17	
09:00	3		0		1		2		4		2		
09:15	0		0		1		1		1		1		
09:30	0		0		0		0		0		0		
09:45	1	4	1	1	4	6	2	5	5	10	3	6	
10:00	4		0		2		4		6		4		
10:15	1		0		2		1		3		1		
10:30	1		0		1		0		2		0		
10:45	2	8	0	0	3	8	1	6	5	16	1	6	
11:00	3		0		3		2		6		2		
11:15	0		0		1		1		1		1		
11:30	3		1		3		1		6		2		
11:45	1	7	0	1	2	9	0	4	3	16	0	5	
Total	35		117		40		157		75		274		
Percent	46.7%		42.7%		53.3%		57.3%						
Day Total		152				197				349			
Peak	10:00	-	02:45	-	10:45	-	02:00	-	10:45	-	02:45	-	- -
Vol.	8	-	23	-	10	-	23	-	18	-	43	-	- -
P.H.F.	0.500		0.821		0.833		0.639		0.750		0.896		

Swallow Cave Road
south of Nahant Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 D Class
Site Code: TBA

NB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
08:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
09:00	7	1	0	0	0	0	0	0	0	0	0	0	0	8
10:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
11:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
12 PM	13	0	0	0	0	0	0	0	0	0	0	0	0	13
13:00	17	1	1	0	0	0	0	0	0	0	0	0	0	19
14:00	17	1	0	0	0	0	0	0	0	0	0	0	0	18
15:00	21	0	0	0	0	0	0	0	0	0	0	0	0	21
16:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
17:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
18:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
19:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
20:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
21:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	164	3	1	0	0	0	0	0	0	0	0	0	0	168
Percent	97.6%	1.8%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	09:00												11:00
Vol.	12	1												12
PM Peak	15:00	13:00	13:00											15:00
Vol.	21	1	1											21

Swallow Cave Road
south of Nahant Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 D Class
Site Code: TBA

NB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
05:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
06:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
07:00	2	1	0	0	0	0	0	0	0	0	0	0	0	3
08:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
09:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
10:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
11:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
12 PM	14	1	0	0	0	0	0	0	0	0	0	0	0	15
13:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
14:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
15:00	23	0	0	0	0	0	0	0	0	0	0	0	0	23
16:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
17:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
18:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
19:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
20:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
21:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	150	2	0	0	0	0	0	0	0	0	0	0	0	152
Percent	98.7%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	07:00												10:00
Vol.	8	1												8
PM Peak	15:00	12:00												15:00
Vol.	23	1												23

Swallow Cave Road
south of Nahant Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 D Class
Site Code: TBA

SB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
07:00	2	1	1	0	0	0	0	0	0	0	0	0	0	4
08:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
09:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
10:00	15	1	0	0	0	0	0	0	0	0	0	0	0	16
11:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
12 PM	23	0	0	0	0	0	0	0	0	0	0	0	0	23
13:00	14	0	0	0	0	0	0	0	0	0	0	0	0	14
14:00	24	0	0	0	0	0	0	0	0	0	0	0	0	24
15:00	25	1	0	0	0	0	0	0	0	0	0	0	0	26
16:00	15	1	0	0	0	0	0	0	0	0	0	0	0	16
17:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
18:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
19:00	20	0	0	0	0	0	0	0	0	0	0	0	0	20
20:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
21:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
22:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
23:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	213	4	1	0	0	0	0	0	0	0	0	0	0	218
Percent	97.7%	1.8%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	07:00	07:00											10:00
Vol.	15	1	1											16
PM Peak	15:00	15:00												15:00
Vol.	25	1												26

Swallow Cave Road
south of Nahant Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 D Class
Site Code: TBA

SB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
07:00	3	1	0	0	0	0	0	0	0	0	0	0	0	4
08:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
09:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
10:00	7	0	1	0	0	0	0	0	0	0	0	0	0	8
11:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
12 PM	16	0	0	0	0	0	0	0	0	0	0	0	0	16
13:00	13	0	0	0	0	0	0	0	0	0	0	0	0	13
14:00	23	0	0	0	0	0	0	0	0	0	0	0	0	23
15:00	17	0	0	0	0	0	0	0	0	0	0	0	0	17
16:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
17:00	18	0	0	0	0	0	0	0	0	0	0	0	0	18
18:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
19:00	16	0	0	0	0	0	0	0	0	0	0	0	0	16
20:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
21:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
22:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
23:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
Total	195	1	1	0	0	0	0	0	0	0	0	0	0	197
Percent	99.0%	0.5%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	07:00	10:00											11:00
Vol.	9	1	1											9
PM Peak	14:00													14:00
Vol.	23													23

Nahant Road
east of Swallow Cave Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 E Volume
Site Code: TBA

Start		EB				WB				Combined			06/03/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Mon
12:00	0		3		0		3		0		6		
12:15	0		3		0		1		0		4		
12:30	0		2		0		2		0		4		
12:45	0	0	5	13	0	0	2	8	0	0	7	21	
01:00	0		1		0		3		0		4		
01:15	0		1		0		2		0		3		
01:30	0		3		0		4		0		7		
01:45	0	0	5	10	0	0	4	13	0	0	9	23	
02:00	0		4		0		4		0		8		
02:15	0		3		0		6		0		9		
02:30	0		6		0		7		0		13		
02:45	0	0	4	17	0	0	5	22	0	0	9	39	
03:00	0		4		0		6		0		10		
03:15	0		3		0		7		0		10		
03:30	0		7		0		6		0		13		
03:45	0	0	4	18	0	0	6	25	0	0	10	43	
04:00	0		1		0		7		0		8		
04:15	0		4		0		8		0		12		
04:30	0		1		0		3		0		4		
04:45	0	0	2	8	0	0	4	22	0	0	6	30	
05:00	0		5		0		10		0		15		
05:15	0		1		0		9		0		10		
05:30	1		0		0		1		1		1		
05:45	1	2	0	6	1	1	1	21	2	3	1	27	
06:00	2		4		1		3		3		7		
06:15	0		0		2		3		2		3		
06:30	1		2		1		1		2		3		
06:45	0	3	2	8	0	4	3	10	0	7	5	18	
07:00	0		1		0		4		0		5		
07:15	2		2		0		3		2		5		
07:30	2		5		0		2		2		7		
07:45	4	8	1	9	0	0	2	11	4	8	3	20	
08:00	5		0		0		2		5		2		
08:15	9		1		4		2		13		3		
08:30	6		2		4		2		10		4		
08:45	10	30	1	4	2	10	2	8	12	40	3	12	
09:00	12		1		1		1		13		2		
09:15	3		0		4		0		7		0		
09:30	5		1		2		0		7		1		
09:45	6	26	0	2	3	10	1	2	9	36	1	4	
10:00	1		0		0		0		1		0		
10:15	6		0		5		0		11		0		
10:30	3		0		3		0		6		0		
10:45	1	11	0	0	1	9	0	0	2	20	0	0	
11:00	0		0		0		0		0		0		
11:15	6		0		3		0		9		0		
11:30	1		0		2		0		3		0		
11:45	2	9	0	0	2	7	0	0	4	16	0	0	
Total	89		95		41		142		130		237		
Percent	68.5%		40.1%		31.5%		59.9%						
Day Total		184				183				367			
Peak	08:15	-	01:45	-	08:15	-	03:30	-	08:15	-	03:00	-	- -
Vol.	37	-	18	-	11	-	27	-	48	-	43	-	- -
P.H.F.	0.771		0.750		0.688		0.844		0.923		0.827		

Nahant Road
east of Swallow Cave Road
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196989 E Volume
Site Code: TBA

Start		EB				WB				Combined			06/04/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	0		1		0		3		0		4		
12:15	0		6		0		2		0		8		
12:30	0		2		0		2		0		4		
12:45	0	0	1	10	0	0	6	13	0	0	7	23	
01:00	1		3		1		4		2		7		
01:15	0		1		0		3		0		4		
01:30	0		1		0		0		0		1		
01:45	0	1	6	11	0	1	6	13	0	2	12	24	
02:00	0		4		0		3		0		7		
02:15	0		1		0		0		0		1		
02:30	0		2		0		4		0		6		
02:45	0	0	4	11	0	0	5	12	0	0	9	23	
03:00	0		3		0		5		0		8		
03:15	0		1		0		3		0		4		
03:30	0		3		0		7		0		10		
03:45	0	0	5	12	0	0	5	20	0	0	10	32	
04:00	0		3		0		10		0		13		
04:15	0		2		0		0		0		2		
04:30	0		5		0		8		0		13		
04:45	0	0	1	11	0	0	4	22	0	0	5	33	
05:00	0		3		0		6		0		9		
05:15	1		2		1		5		2		7		
05:30	0		4		0		5		0		9		
05:45	0	1	2	11	0	1	3	19	0	2	5	30	
06:00	1		0		1		1		2		1		
06:15	0		0		1		3		1		3		
06:30	0		4		0		4		0		8		
06:45	1	2	2	6	0	2	3	11	1	4	5	17	
07:00	1		1		1		3		2		4		
07:15	2		2		2		1		4		3		
07:30	0		1		0		2		0		3		
07:45	5	8	2	6	1	4	2	8	6	12	4	14	
08:00	3		3		2		1		5		4		
08:15	8		2		1		2		9		4		
08:30	10		1		3		1		13		2		
08:45	10	31	2	8	2	8	2	6	12	39	4	14	
09:00	1		2		0		3		1		5		
09:15	5		1		1		1		6		2		
09:30	1		1		0		0		1		1		
09:45	6	13	0	4	1	2	0	4	7	15	0	8	
10:00	3		0		2		2		5		2		
10:15	3		0		3		1		6		1		
10:30	1		0		1		0		2		0		
10:45	3	10	0	0	1	7	0	3	4	17	0	3	
11:00	0		0		2		0		2		0		
11:15	2		0		2		0		4		0		
11:30	4		0		0		0		4		0		
11:45	2	8	0	0	2	6	0	0	4	14	0	0	
Total	74		90		31		131		105		221		
Percent	70.5%		40.7%		29.5%		59.3%						
Day Total		164				162				326			
Peak	08:00	-	03:45	-	08:00	-	03:15	-	08:00	-	03:45	-	- -
Vol.	31	-	15	-	8	-	25	-	39	-	38	-	- -
P.H.F.	0.775		0.750		0.667		0.625		0.750		0.731		

Nahant Road
east of Swallow Cave Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 E Class
Site Code: TBA

EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
06:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
07:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
08:00	30	0	0	0	0	0	0	0	0	0	0	0	0	30
09:00	25	1	0	0	0	0	0	0	0	0	0	0	0	26
10:00	10	1	0	0	0	0	0	0	0	0	0	0	0	11
11:00	8	1	0	0	0	0	0	0	0	0	0	0	0	9
12 PM	13	0	0	0	0	0	0	0	0	0	0	0	0	13
13:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
14:00	17	0	0	0	0	0	0	0	0	0	0	0	0	17
15:00	18	0	0	0	0	0	0	0	0	0	0	0	0	18
16:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
17:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
18:00	6	2	0	0	0	0	0	0	0	0	0	0	0	8
19:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
20:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
21:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	179	5	0	0	0	0	0	0	0	0	0	0	0	184
Percent	97.3%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	09:00												08:00
Vol.	30	1												30
PM Peak	15:00	18:00												15:00
Vol.	18	2												18

Nahant Road
east of Swallow Cave Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 E Class
Site Code: TBA

EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
07:00	7	1	0	0	0	0	0	0	0	0	0	0	0	8
08:00	30	1	0	0	0	0	0	0	0	0	0	0	0	31
09:00	13	0	0	0	0	0	0	0	0	0	0	0	0	13
10:00	8	2	0	0	0	0	0	0	0	0	0	0	0	10
11:00	7	1	0	0	0	0	0	0	0	0	0	0	0	8
12 PM	10	0	0	0	0	0	0	0	0	0	0	0	0	10
13:00	10	1	0	0	0	0	0	0	0	0	0	0	0	11
14:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
15:00	11	1	0	0	0	0	0	0	0	0	0	0	0	12
16:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
17:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
18:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
19:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
20:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
21:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	157	7	0	0	0	0	0	0	0	0	0	0	0	164
Percent	95.7%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	10:00												08:00
Vol.	30	2												31
PM Peak	14:00	13:00												15:00
Vol.	11	1												12

Nahant Road
east of Swallow Cave Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 E Class
Site Code: TBA

WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
09:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
10:00	8	1	0	0	0	0	0	0	0	0	0	0	0	9
11:00	6	1	0	0	0	0	0	0	0	0	0	0	0	7
12 PM	8	0	0	0	0	0	0	0	0	0	0	0	0	8
13:00	13	0	0	0	0	0	0	0	0	0	0	0	0	13
14:00	22	0	0	0	0	0	0	0	0	0	0	0	0	22
15:00	25	0	0	0	0	0	0	0	0	0	0	0	0	25
16:00	22	0	0	0	0	0	0	0	0	0	0	0	0	22
17:00	21	0	0	0	0	0	0	0	0	0	0	0	0	21
18:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
19:00	9	2	0	0	0	0	0	0	0	0	0	0	0	11
20:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
21:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	178	5	0	0	0	0	0	0	0	0	0	0	0	183
Percent	97.3%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	09:00												08:00
Vol.	10	1												10
PM Peak	15:00	19:00												15:00
Vol.	25	2												25

Nahant Road
east of Swallow Cave Road
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 E Class
Site Code: TBA

WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
07:00	3	1	0	0	0	0	0	0	0	0	0	0	0	4
08:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
09:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
10:00	5	2	0	0	0	0	0	0	0	0	0	0	0	7
11:00	5	1	0	0	0	0	0	0	0	0	0	0	0	6
12 PM	13	0	0	0	0	0	0	0	0	0	0	0	0	13
13:00	11	2	0	0	0	0	0	0	0	0	0	0	0	13
14:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
15:00	19	1	0	0	0	0	0	0	0	0	0	0	0	20
16:00	22	0	0	0	0	0	0	0	0	0	0	0	0	22
17:00	19	0	0	0	0	0	0	0	0	0	0	0	0	19
18:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
19:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
20:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
21:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
22:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	155	7	0	0	0	0	0	0	0	0	0	0	0	162
Percent	95.7%	4.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	10:00												08:00
Vol.	8	2												8
PM Peak	16:00	13:00												16:00
Vol.	22	2												22

Willow Road just east of
Kelley Greens
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 F Volume
Site Code: TBA

Start	EB				WB				Combined				06/03/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Mon
12:00	0		3		0		6		0		9		
12:15	0		4		0		1		0		5		
12:30	0		2		0		1		0		3		
12:45	0	0	1	10	0	0	1	9	0	0	2	19	
01:00	0		3		0		2		0		5		
01:15	1		0		1		3		2		3		
01:30	0		3		0		3		0		6		
01:45	0	1	6	12	0	1	3	11	0	2	9	23	
02:00	0		2		0		6		0		8		
02:15	0		6		0		4		0		10		
02:30	0		6		0		9		0		15		
02:45	0	0	8	22	0	0	6	25	0	0	14	47	
03:00	0		6		0		7		0		13		
03:15	0		1		0		8		0		9		
03:30	0		6		0		9		0		15		
03:45	0	0	7	20	0	0	6	30	0	0	13	50	
04:00	0		2		0		7		0		9		
04:15	0		3		0		8		0		11		
04:30	1		4		1		11		2		15		
04:45	0	1	7	16	0	1	11	37	0	2	18	53	
05:00	0		2		0		11		0		13		
05:15	0		4		1		8		1		12		
05:30	1		2		0		8		1		10		
05:45	0	1	4	12	6	7	9	36	6	8	13	48	
06:00	2		5		1		7		3		12		
06:15	0		8		2		5		2		13		
06:30	1		5		3		9		4		14		
06:45	3	6	7	25	1	7	1	22	4	13	8	47	
07:00	0		8		2		3		2		11		
07:15	2		13		3		5		5		18		
07:30	1		4		0		3		1		7		
07:45	2	5	12	37	1	6	4	15	3	11	16	52	
08:00	1		11		2		0		3		11		
08:15	4		3		4		1		8		4		
08:30	0		3		4		2		4		5		
08:45	4	9	9	26	8	18	2	5	12	27	11	31	
09:00	2		7		3		1		5		8		
09:15	1		3		2		2		3		5		
09:30	2		1		1		1		3		2		
09:45	3	8	2	13	4	10	0	4	7	18	2	17	
10:00	1		3		3		1		4		4		
10:15	2		1		4		0		6		1		
10:30	4		0		3		0		7		0		
10:45	3	10	1	5	2	12	0	1	5	22	1	6	
11:00	4		2		5		0		9		2		
11:15	4		0		2		0		6		0		
11:30	12		1		2		0		14		1		
11:45	5	25	4	7	8	17	0	0	13	42	4	7	
Total	66		205		79		195		145		400		
Percent	45.5%		51.3%		54.5%		48.8%						
Day Total		271				274				545			
Peak	11:00	-	07:15	-	08:15	-	04:15	-	11:00	-	04:30	-	- -
Vol.	25	-	40	-	19	-	41	-	42	-	58	-	- -
P.H.F.	0.521		0.769		0.594		0.932		0.750		0.806		

Willow Road just east of
Kelley Greens
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Email: datarequests@pdillc.com

196989 F Volume
Site Code: TBA

Start	EB				WB				Combined				06/04/19
Time	A.M.		P.M.		A.M.		P.M.		A.M.		P.M.		Tue
12:00	3		0		1		2		4		2		
12:15	2		7		0		3		2		10		
12:30	0		0		0		2		0		2		
12:45	0	5	3	10	0	1	3	10	0	6	6	20	
01:00	0		2		0		2		0		4		
01:15	0		4		0		2		0		6		
01:30	0		4		0		3		0		7		
01:45	0	0	2	12	0	0	4	11	0	0	6	23	
02:00	0		1		0		4		0		5		
02:15	0		4		0		4		0		8		
02:30	0		2		0		3		0		5		
02:45	0	0	2	9	0	0	1	12	0	0	3	21	
03:00	0		5		0		6		0		11		
03:15	1		5		1		5		2		10		
03:30	0		3		0		6		0		9		
03:45	0	1	2	15	1	2	7	24	1	3	9	39	
04:00	0		5		0		7		0		12		
04:15	1		1		0		6		1		7		
04:30	1		0		1		6		2		6		
04:45	1	3	4	10	1	2	10	29	2	5	14	39	
05:00	0		4		0		5		0		9		
05:15	0		3		0		2		0		5		
05:30	1		1		2		3		3		4		
05:45	0	1	2	10	0	2	8	18	0	3	10	28	
06:00	0		3		2		3		2		6		
06:15	0		2		1		0		1		2		
06:30	1		3		3		3		4		6		
06:45	3	4	4	12	2	8	1	7	5	12	5	19	
07:00	0		9		1		1		1		10		
07:15	1		8		0		1		1		9		
07:30	1		6		2		9		3		15		
07:45	2	4	7	30	1	4	8	19	3	8	15	49	
08:00	1		6		6		1		7		7		
08:15	1		6		4		3		5		9		
08:30	1		4		3		0		4		4		
08:45	3	6	9	25	3	16	2	6	6	22	11	31	
09:00	2		4		2		0		4		4		
09:15	5		2		4		0		9		2		
09:30	0		0		0		1		0		1		
09:45	2	9	0	6	3	9	0	1	5	18	0	7	
10:00	6		4		4		0		10		4		
10:15	1		4		5		0		6		4		
10:30	4		2		1		0		5		2		
10:45	8	19	0	10	5	15	0	0	13	34	0	10	
11:00	4		0		2		0		6		0		
11:15	4		0		4		0		8		0		
11:30	1		0		2		0		3		0		
11:45	4	13	0	0	1	9	0	0	5	22	0	0	
Total	65		149		68		137		133		286		
Percent	48.9%		52.1%		51.1%		47.9%						
Day Total		214				205				419			
Peak	10:30	-	07:00	-	08:00	-	04:00	-	10:00	-	07:00	-	- -
Vol.	20	-	30	-	16	-	29	-	34	-	49	-	- -
P.H.F.	0.625		0.833		0.667		0.725		0.654		0.817		

Willow Road just east of
Kelley Greens
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

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Email: datarequests@pdillc.com

196989 F Class
Site Code: TBA

EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
07:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
08:00	6	3	0	0	0	0	0	0	0	0	0	0	0	9
09:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
10:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
11:00	22	3	0	0	0	0	0	0	0	0	0	0	0	25
12 PM	10	0	0	0	0	0	0	0	0	0	0	0	0	10
13:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
14:00	21	0	1	0	0	0	0	0	0	0	0	0	0	22
15:00	20	0	0	0	0	0	0	0	0	0	0	0	0	20
16:00	14	2	0	0	0	0	0	0	0	0	0	0	0	16
17:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
18:00	25	0	0	0	0	0	0	0	0	0	0	0	0	25
19:00	37	0	0	0	0	0	0	0	0	0	0	0	0	37
20:00	26	0	0	0	0	0	0	0	0	0	0	0	0	26
21:00	13	0	0	0	0	0	0	0	0	0	0	0	0	13
22:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
23:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
Total	261	9	1	0	0	0	0	0	0	0	0	0	0	271
Percent	96.3%	3.3%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	11:00	08:00												11:00
Vol.	22	3												25
PM Peak	19:00	16:00	14:00											19:00
Vol.	37	2	1											37

Willow Road just east of
Kelley Greens
City, State: Nahant, MA
Client: Nitsch/ B. Zimolka

PRECISION DATA INDUSTRIES, LLC
46 Morton Street, Framingham, MA 01702
Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 F Class
Site Code: TBA

EB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1 9	5	0	0	0	0	0	0	0	0	0	0	0	0	5
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
04:00	3	0	0	0	0	0	0	0	0	0	0	0	0	3
05:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
07:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
08:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
09:00	7	2	0	0	0	0	0	0	0	0	0	0	0	9
10:00	18	1	0	0	0	0	0	0	0	0	0	0	0	19
11:00	12	1	0	0	0	0	0	0	0	0	0	0	0	13
12 PM	10	0	0	0	0	0	0	0	0	0	0	0	0	10
13:00	11	1	0	0	0	0	0	0	0	0	0	0	0	12
14:00	9	0	0	0	0	0	0	0	0	0	0	0	0	9
15:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
16:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
17:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
18:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
19:00	30	0	0	0	0	0	0	0	0	0	0	0	0	30
20:00	25	0	0	0	0	0	0	0	0	0	0	0	0	25
21:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
22:00	10	0	0	0	0	0	0	0	0	0	0	0	0	10
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	207	7	0	0	0	0	0	0	0	0	0	0	0	214
Percent	96.7%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	10:00	09:00												10:00
Vol.	18	2												19
PM Peak	19:00	13:00												19:00
Vol.	30	1												30

Willow Road just east of
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Office: 508-875-0100 Fax: 508-875-0118
Email: datarequests@pdillc.com

196989 F Class
Site Code: TBA

WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/03/19	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
05:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
06:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
07:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
08:00	16	2	0	0	0	0	0	0	0	0	0	0	0	18
09:00	9	1	0	0	0	0	0	0	0	0	0	0	0	10
10:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
11:00	15	2	0	0	0	0	0	0	0	0	0	0	0	17
12 PM	9	0	0	0	0	0	0	0	0	0	0	0	0	9
13:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
14:00	24	0	1	0	0	0	0	0	0	0	0	0	0	25
15:00	30	0	0	0	0	0	0	0	0	0	0	0	0	30
16:00	36	1	0	0	0	0	0	0	0	0	0	0	0	37
17:00	36	0	0	0	0	0	0	0	0	0	0	0	0	36
18:00	22	0	0	0	0	0	0	0	0	0	0	0	0	22
19:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
20:00	5	0	0	0	0	0	0	0	0	0	0	0	0	5
21:00	4	0	0	0	0	0	0	0	0	0	0	0	0	4
22:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	267	6	1	0	0	0	0	0	0	0	0	0	0	274
Percent	97.4%	2.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	08:00												08:00
Vol.	16	2												18
PM Peak	16:00	16:00	14:00											16:00
Vol.	36	1	1											37

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196989 F Class
Site Code: TBA

WB

Start Time	Cars	Medium Heavy	Large Heavy											Total
06/04/1														
9	1	0	0	0	0	0	0	0	0	0	0	0	0	1
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
04:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
05:00	2	0	0	0	0	0	0	0	0	0	0	0	0	2
06:00	8	0	0	0	0	0	0	0	0	0	0	0	0	8
07:00	3	0	1	0	0	0	0	0	0	0	0	0	0	4
08:00	16	0	0	0	0	0	0	0	0	0	0	0	0	16
09:00	8	1	0	0	0	0	0	0	0	0	0	0	0	9
10:00	15	0	0	0	0	0	0	0	0	0	0	0	0	15
11:00	8	1	0	0	0	0	0	0	0	0	0	0	0	9
12 PM	10	0	0	0	0	0	0	0	0	0	0	0	0	10
13:00	11	0	0	0	0	0	0	0	0	0	0	0	0	11
14:00	12	0	0	0	0	0	0	0	0	0	0	0	0	12
15:00	24	0	0	0	0	0	0	0	0	0	0	0	0	24
16:00	29	0	0	0	0	0	0	0	0	0	0	0	0	29
17:00	17	1	0	0	0	0	0	0	0	0	0	0	0	18
18:00	7	0	0	0	0	0	0	0	0	0	0	0	0	7
19:00	19	0	0	0	0	0	0	0	0	0	0	0	0	19
20:00	6	0	0	0	0	0	0	0	0	0	0	0	0	6
21:00	1	0	0	0	0	0	0	0	0	0	0	0	0	1
22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	201	3	1	0	0	0	0	0	0	0	0	0	0	205
Percent	98.0%	1.5%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
AM Peak	08:00	09:00	07:00											08:00
Vol.	16	1	1											16
PM Peak	16:00	17:00												16:00
Vol.	29	1												29

3. Additional details on the lobster hatchery provided to DMF

Narrative:
The following information was provided to the Department of Marine Fisheries on July 3, 2019.

The mitigation count of 90,000 stage 4 larvae was based on the 2,400 GPM flow rate and not adjusted down for mitigation compensation for the revised 600 GPM flow rate. Northeastern is committed to the full 90,000 mitigation count despite the reduced operational flow rate of 600 GPM.

TAG Engineering

Specializing in Aquaculture Applications

Considerations for producing a lobster enhancement project at Northeastern University – Nahant.

Lobster enhancement through artificial rearing is a commonly utilized strategy to replenish overfished or damaged lobster populations throughout the natural range of the lobster, both clawed (Homarid) and spiny (Panularid). There are a number of active and successful lobster hatcheries in operation around the globe, focused on both enhancement of natural stocks or full aquaculture grow-out to market size. The following is a quick breakdown of a proposed lobster enhancement project that could be implemented by NU to counter suspected impingement of lobster larvae via the proposed seawater intakes.

Larval entrainment for the proposed seawater intakes was calculated based on an average lobster larval density of 43.7 larvae per 1,000 m^3 of seawater and a maximum water withdrawal rate of 2,400 gpm. It is anticipated that this density of larvae would be observed in the local waters around Nahant during the months of May through September. Using these values, the total number of larvae impacted would be in the vicinity of 90,000 larvae over the five month interval. Estimated survival of lobsters from egg to market size is thought to be somewhere between 0.004 to 0.02%, suggesting that a loss of 100,000 individuals during the larval phase would result in a loss of, at most, 20 market-sized lobsters after the 5 to 8 year growth interval. However, by jumpstarting lobster growth through caring for the species in a protected environment during the early four larval stages, NU can have a much larger affect on replacing those lost larvae than returning the 20 lobsters projected to be lost due to impingement with the intakes.

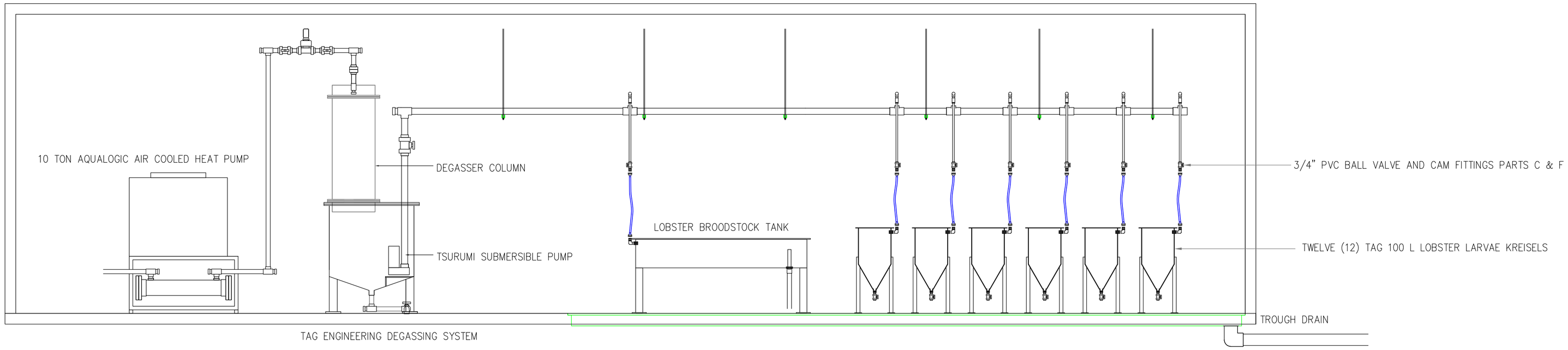
Month	Lobster Larvae Entrained
May	17,154
June	17,154
July	17,154
August	17,154
September	17,154
Yearly Total	85,772

To provide replacement of 90,000 late stage IV lobster larvae, the following equipment and facilities would be required:

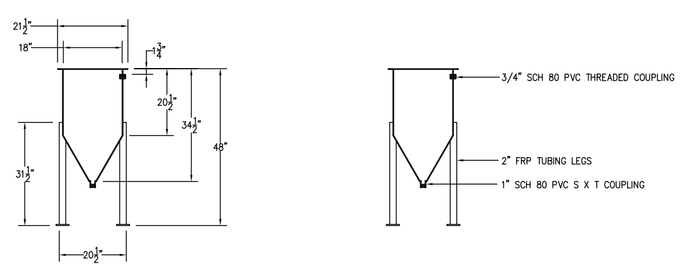
- Broodstock acquisition and holding: berried females would need to be collected from commercial fishermen (permitted to land ovigerous females) over the course of the year and held at the NU Marine Laboratory
    - Number of berried females: somewhere between 10 to 20 depending on their size and fecundity.
    - Holding tank: a communal holding tank would be required with enough space to house 20 berried females, preferably with habitat that allows for a reduced stress environment. A 32 ft^2 surface area square or round tank set up with flow through of ambient water would suffice.

P.O. Box 558, Woods Hole, MA 02543 • (508) 362-0561 • rgalat@whoi.edu

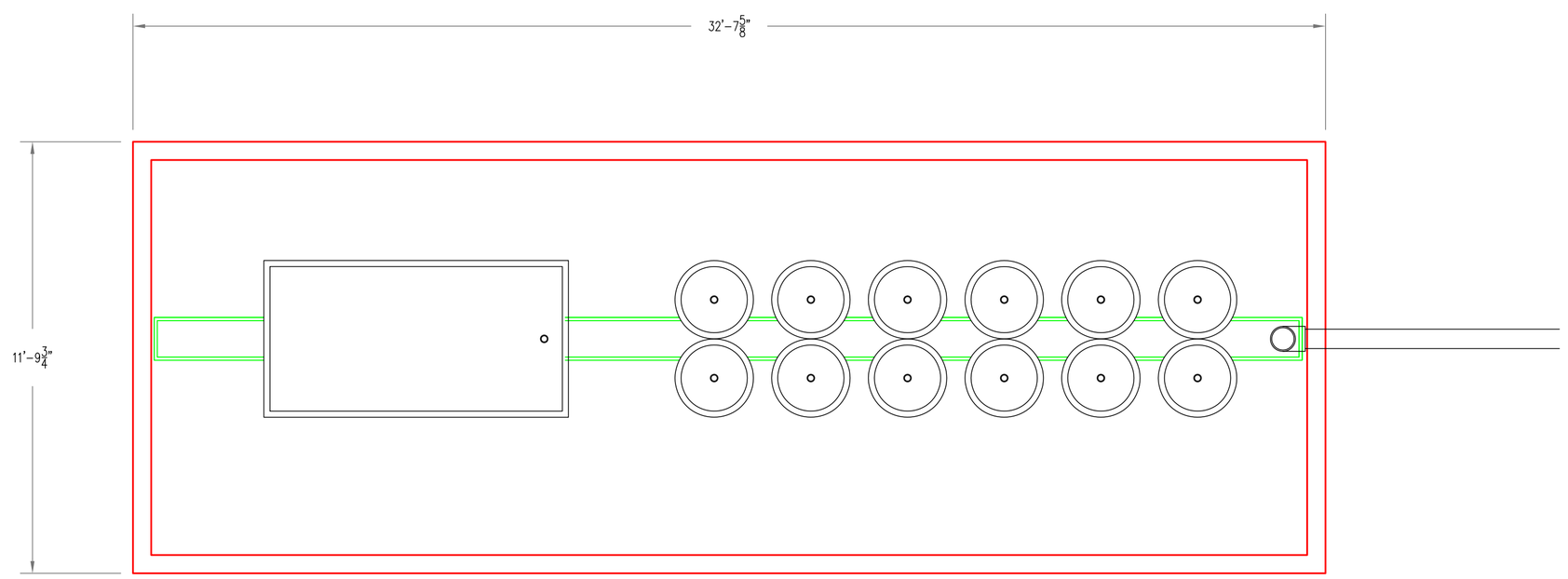
- Hatching: as the eggs approached the hatching time (detected by a change in egg color), the ovigerous females would be transferred to smaller tanks, set up to hold the single lobster and configured with an overflow that traps the hatched larvae onto a submerged screen. Five such systems would be required to accommodate the potential hatching sequence in the facility.
    - Something as simple as a 20-30 gallon glass aquarium would be sufficient for each lobster.
- Larval holding density = the recommended density for larval rearing is 25 larvae per liter or approximately 100 per gallon.
- Larval rearing tank style: a number of options are available for holding and rearing lobster larvae through the four planktonic larval stages. These include
    - The traditional Hughes pot: a 40 liter round bottom fiberglass tank that is configured to allow an upwelling water flow, circulating the water in the tank to reduce the risk of cannibalism in the larvae. Will hold ~1,000 larvae per run.
    - A larger 90 liter conical bottom fiberglass or HDPE tank with a banjo filter on the overflow and an airstone at the center base of the conical bottom to induce water circulation in the tank. Will hold ~ 2,250 larvae per run.
    - An even larger 150 liter conical (set up as above). Will hold ~3,750 per run.
    - A larger conical tank, on the order of 150 gallons (normally run as a static system). Will hold 15,000 per run, although as a static system the density may need to be decreased.
- Larval rearing total tank volume:
    - If it is assumed that the laboratory could provide 4 production cycles for larval release at stage IV during one summer growing season, provided that the berried females are in the correct stages of development.
    - Therefore, the total tank numbers for larval rearing would be:
        - If using 40 liter Hughes pots = 25 tanks
        - If using 90 liter conicals = 11 tanks (recommended)
        - If using 150 liter conicals = 7 tanks
        - If using 150 gallon conicals = 2 tanks
- Feeding:
    - Frozen brine shrimp seem to work fine when combined with the addition of a highly polyunsaturated lipid supplement.
- Labor: I would anticipate that this could be maintained by a full time technician or the coordinated efforts of multiple part-time employees.
    - Estimated water flow requirements: each tank would need a flow rate of
        - Broodstock holding – 10-25 liters per minute of ambient seawater
        - Egg hatching – 5-10 liters per minute of ambient seawater per tank
        - Larval rearing – flow dependent on tank size and stocking density – for the 40 and 90 liter systems then a rate of 10-15 liters per minute of heated (20°C) water would be required per tank.
- Larval release:
    - Efforts would need to be made to identify appropriate locations for juvenile release that would enhance the probability of survival.
    - Appropriate habitat is described in the published literature.



TAG ENGINEERING DEGASSING SYSTEM

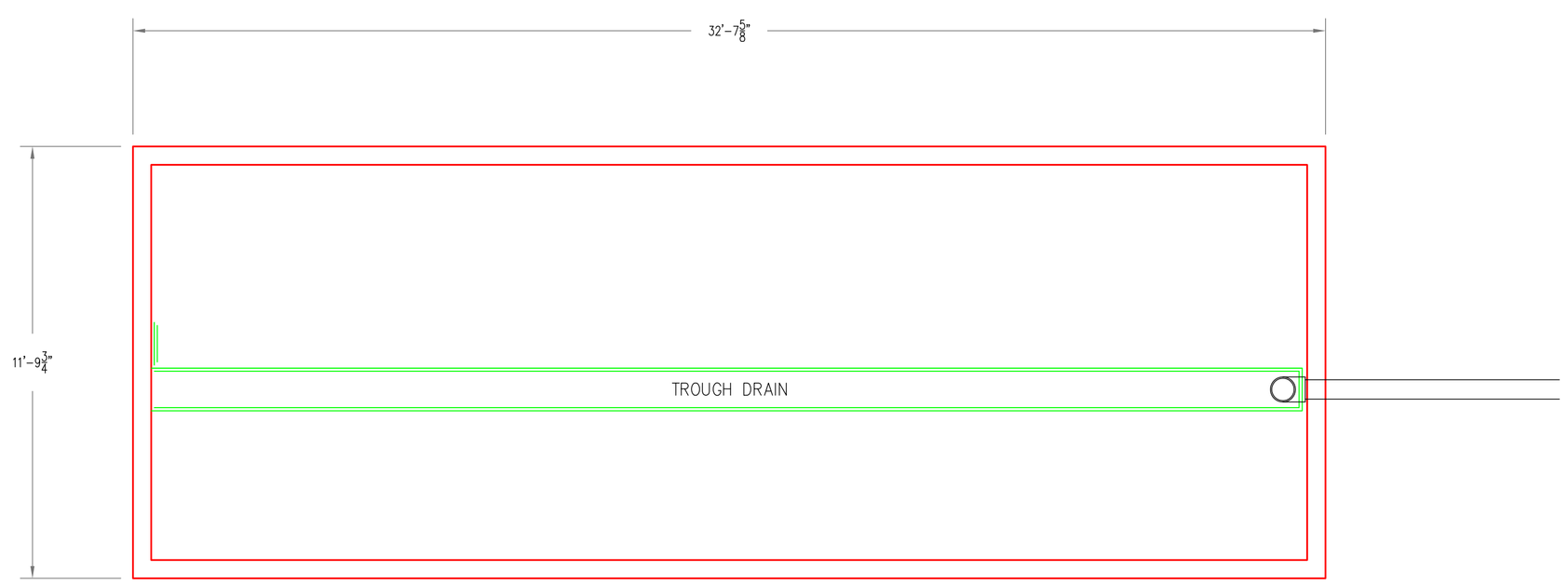


TAG 100 L LOBSTER LARVAE KREISEL



NAHANT MARINE LABORATORY LOBSTER HATCHERY

SCALE: NONE



TAG ENGINEERING LLC
WOODS HOLE, MA
FEB 13, 2018

4. NPDES permitting

Narrative:
The following information was provided to MEPA via email on June 26th in response to their emailed request for clarifications on June 25th

Complete email correspondence included as Attachment 1.

Over the last 18 months, Northeastern has worked closely with the DEP/EPA to determine the effects of the existing and proposed systems on the marine habitats. Attached below are conventional pollutant testing conducted by a third-party agency requested by the EPA. The results fall below the NPDES effluent limitations – most even falling Below Recordable Limits (BRL).

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063

8 Jan Sebastian Drive
Sandwich, MA 02563
(508)888-6460 1-800-339-6460
FAX (508)888-6446

Day 1
Low Tide
Influent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: Nahant Sea Water Effluent
Project Number:
Sampled By: Burgess
Lab Order Number: WW-190696
Date Received: 04/08/19

Comments:

Sample Type	Sample Time	Sample Date	Comments			
Influent A	08:45	04/08/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/09/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/10/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/15/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.49	0.01	04/08/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<1.1	NA	04/10/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	3.0	1.0	04/09/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.022	0.005	04/11/19	MC	SM 4500-P B,E
Dissolved Oxygen	mg/L	9.2	1.0	04/08/19	KB	4000-O C
pH in field	pH units	7.69	NA	04/08/19	KB	SM 4500 H B

All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.

We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

By: Ronald J. Saari
Ronald J. Saari
Laboratory Director

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063

8 Jan Sebastian Drive
Sandwich, MA 02563
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FAX (508)888-6446

Day 1
Low Tide
Effluent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* **Comments:**
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190696*
Date Received: *04/08/19*

Sample Type	Sample Time	Sample Date	Comments			
Effluent B	08:15	04/08/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5 Day	mg/L	BRL	2.0	04/09/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/10/19	KB	SM4500-Norg B-C
Ammonia N	mg/L	BRL	0.50	04/15/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.46	0.01	04/08/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<1.1	NA	04/10/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	28	1.5	04/09/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.024	0.005	04/11/19	MC	SM 4500-P B,E
Dissolved Oxygen	mg/L	9.1	1.0	04/08/19	KB	4000-O C
pH in field	pH units	7.63	NA	04/08/19	KB	SM 4500 H-B

All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.

We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

By: _____
Ronald J. Saari
Laboratory Director

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063

8 Jan Sebastian Drive
Sandwich, MA 02563
(508)888-6460 1-800-339-6460
FAX (508)888-6446

Day 1
Mid Tide
Influent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* **Comments:**
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190696*
Date Received: *04/08/19*

Sample Type	Sample Time	Sample Date	Comments			
Influent C	10:50	04/08/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/09/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/10/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/15/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.42	0.01	04/08/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<1.1	NA	04/10/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	8.0	1.5	04/09/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.021	0.005	04/11/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	9.2	1.0	04/08/19	KB	4000-O C
pH in field	pH units	7.73	NA	04/08/19	KB	SM 4500 H-B

All samples were analyzed within the established guidelines of US EPA approved methods with all requirements met, unless otherwise noted at the end of a given sample's analytical results.

We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

By: _____
Ronald J. Saari
Laboratory Director

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063

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430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* **Comments:**
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190696*
Date Received: *04/08/19*

Sample Type	Sample Time	Sample Date	Comments			
Effluent D	11:00	04/08/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/09/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/10/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/15/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.33	0.01	04/08/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<0.93	NA	04/10/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	18	1.5	04/09/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.015	0.005	04/11/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	9.2	1.0	04/08/19	KB	4000-O C
pH in field	pH units	7.66	NA	04/08/19	KB	SM 4500 H-B

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We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

By: Ronald J. Saari

Ronald J. Saari
Laboratory Director

ENVIROTECH LABORATORIES, INC.
MA CERT. NO.: M-MA 063

8 Jan Sebastian Drive
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(508)888-6460 1-800-339-6460
FAX (508)888-6446

Day 1
High Tide
Influent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent*
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190696*
Date Received: *04/08/19*

Comments:

Sample Type	Sample Time	Sample Date	Comments			
Influent E	13:50	04/08/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/09/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/10/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/15/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.31	0.01	04/08/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<0.91	NA	04/10/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	6.0	1.5	04/08/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.020	0.005	04/11/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	9.5	1.0	04/08/19	KB	4000-O C
pH In field	pH units	7.75	NA	04/08/19	KB	SM 4500 H-B

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Day 1
High Tide
Effluent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent*
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190696*
Date Received: *04/08/19*

Comments:

Sample Type	Sample Time	Sample Date	Comments
Effluent F	14:00	04/08/19	

Parameters	Units	Test Results	Reportable Limits	Date Analyzed	Analyst	Method
BOD 5-Day	mg/L	BRL	2.0	04/09/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/10/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/15/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.16	0.01	04/08/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<0.76	NA	04/10/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	13	1.5	04/09/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.022	0.005	04/11/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	9.50	1.0	04/08/19	KB	4000-O C
pH in field	pH units	7.85	NA	04/08/19	KB	SM 4500 H-B

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Day 2
Low Tide
Influent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: Nahant Sea Water Effluent
Comments:
Project Number:
Sampled By: Burgess
Lab Order Number: WW-190741
Date Received: 04/11/19

Sample Type	Sample Time	Sample Date	Comments			
Influent A	10:00	04/11/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/11/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/16/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/18/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.49	0.01	04/12/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<1.1	NA	04/16/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	BRL	1.5	04/24/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.018	0.005	04/22/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	9.5	1.0	04/11/19	KB	4000-O C
pH in field	pH units	7.96	NA	04/11/19	KB	SM 4500 H-B

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We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

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Ronald J. Saari
Laboratory Director

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Day 2
Low Tide
Effluent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* ***Comments:***
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190741*
Date Received: *04/11/19*

Sample Type	Sample Time	Sample Date	Comments
Effluent B	10:15	04/11/19	

Parameters	Units	Test Results	Reportable Limits	Date Analyzed	Analyst	Method
BOD 5-Day	mg/L	BRL	2.0	04/11/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/16/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/18/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.56	0.01	04/12/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<1.2	NA	04/16/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	BRL	1.5	04/24/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.024	0.005	04/22/19	MC	SM 4500-P-B,F
Dissolved Oxygen	mg/L	9.5	1.0	04/11/19	KB	4000-O C
pH in field	pH units	7.98	NA	04/11/19	KB	SM 4500 H B

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We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

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Day 2
Mid Tide
Influent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* **Comments:**
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190741*
Date Received: *04/11/19*

Sample Type	Sample Time	Sample Date	Comments			
Influent C	12:30	04/11/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/11/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/16/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/18/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.47	0.01	04/12/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<1.1	NA	04/16/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	3.0	1.5	04/24/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.022	0.005	04/22/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	10.0	1.0	04/11/19	KB	4000-O C
pH in field	pH units	8.05	NA	04/11/19	KB	SM 4500 H-B

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We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

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Ronald J. Saari
Laboratory Director

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Day 2
Mid Tide
Effluent

Tuesday, May 7, 2019

Northeastern University
430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* **Comments:**
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190741*
Date Received: *04/11/19*

Sample Type	Sample Time	Sample Date	Comments			
Effluent D	12:45	04/11/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/11/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/16/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/16/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.24	0.01	04/12/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<0.84	NA	04/16/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	5.0	1.5	04/24/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.016	0.005	04/22/19	MC	SM 4500-P B,E
Dissolved Oxygen	mg/L	10.0	1.0	04/11/19	KB	4000-O C
pH in field	pH units	8.04	NA	04/11/19	KB	SM 4500 H-B

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Tuesday, May 7, 2019

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Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent* **Comments:**
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190741*
Date Received: *04/11/19*

Sample Type	Sample Time	Sample Date	Comments			
Influent E	14:45	04/11/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/11/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/16/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/18/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.30	0.01	04/12/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<0.90	NA	04/16/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	BRL	1.5	04/24/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.022	0.005	04/22/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	8.9	1.0	04/11/19	KB	4000-O C
pH in field	pH units	7.94	NA	04/11/19	KB	SM 4500 H-B

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We certify that the following results are true and accurate to the best of our knowledge.

BRL=below reportable limits

**see attached*

By: _____
Ronald J. Saari
Laboratory Director

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Tuesday, May 7, 2019

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430 Nahant Rd
Nahant, MA 019

ProjectName: *Nahant Sea Water Effluent*
Project Number:
Sampled By: *Burgess*
Lab Order Number: *WW-190741*
Date Received: *04/11/19*

Comments:

Sample Type	Sample Time	Sample Date	Comments			
Effluent F	15:00	04/11/19				
Parameters	**Units**	**Test Results**	**Reportable Limits**	**Date Analyzed**	**Analyst**	**Method**
BOD 5-Day	mg/L	BRL	2.0	04/11/19	MC	SM 5210 B
Kjeldhal Nitrogen	mg/L	BRL	0.60	04/16/19	KB	SM4500-Norg B-C
Ammonia-N	mg/L	BRL	0.50	04/18/19	KB	SM4500 NH3 C
Nitrate-N/Nitrite-N	mg/L	0.14	0.01	04/12/19	MC	SM 4500-NO3 E
Total Nitrogen	mg/L	<0.74	NA	04/16/19	KB	Calculation
Oil & Grease Grab	mg/L	BRL	1.0	04/13/19	MC	EPA 1664
Total Suspended Solids	mg/L	14	1.5	04/24/19	KB	SM 2540 D
Total Phosphorous (P)	mg/L	0.024	0.005	04/22/19	MC	SM 4500-P-B,E
Dissolved Oxygen	mg/L	9.0	1.0	04/11/19	KB	4000-O C
pH in field	pH units	8.00	NA	04/11/19	KB	SM 4500 H-B

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**see attached*

By: Ronald J. Sauri

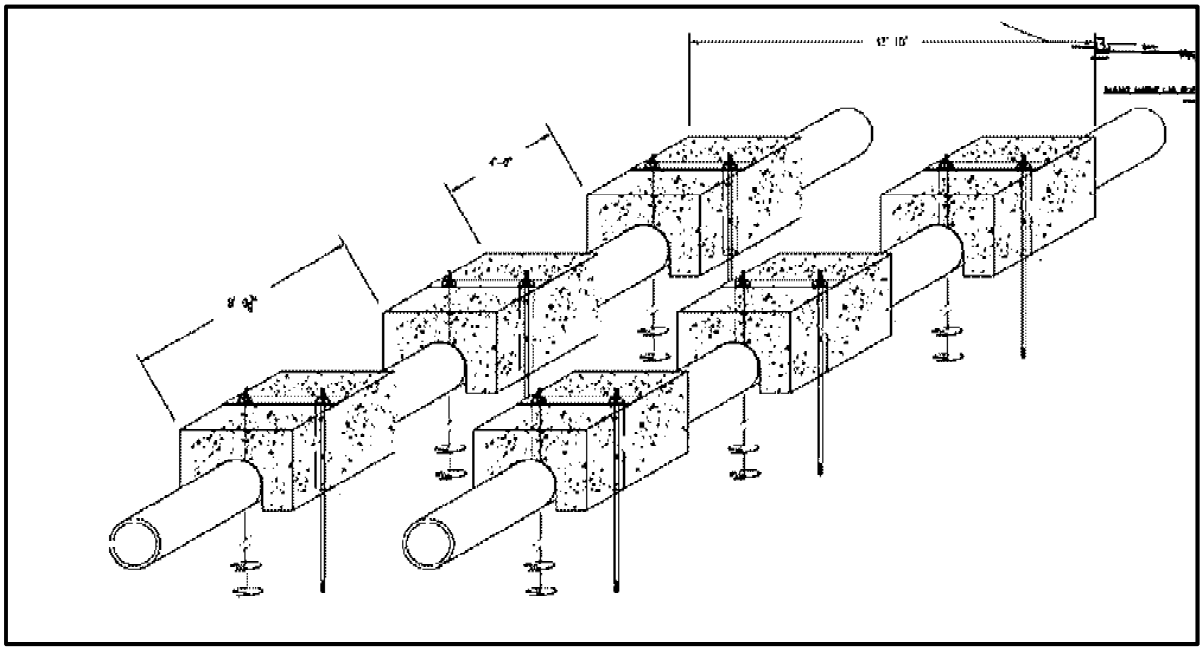
Ronald J. Sauri
Laboratory Director

5. Details on LUO impacts. Will there be temporary impacts associated with the installation of the pipes/ballast blocks? How will they be installed? Will a 401 Water Quality Certificate be required for installation of new system/removal of old system?

Narrative:

1. Will there be temporary impacts associated with the installation of the pipes/ballast blocks?

All proposed impacts to Land Under the Ocean (LUO) are permanent and are associated with the ballast blocks for the seawater intake and discharge pipes, and with the concrete pads for the intake structures. No temporary impacts are necessary or proposed.



The intake and discharge pipes will be secured to the Cove bottom using concrete ballast blocks with either helix anchors if the supporting substratum is sand, or stainless steel threaded rods that will be drilled and epoxied into the bedrock. Depending on their exact location, which may vary slightly from plan due to actual conditions on the ocean floor, the pipes may be secured to the seafloor using a single ballast block 4’-0” long x 6’-5” wide x 2’-9” deep (25.67 sf/block), or separately with individual ballast blocks 4’ long x 3’-10” wide x 2’-9” deep (15.33 sf/block). To conservatively over-estimate the potential

square foot impacts to Land Under the Ocean it has been assumed that the pipes will be anchored separately with individual blocks. An estimated 70 ballast blocks will be needed for the intake lines and an estimated 40 ballast blocks will be needed for the discharge lines.

In addition to the ballast blocks, each of the seawater intake structures will be mounted on a 22' x 8' precast concrete pad (176 sf each) resulting in an additional approximately 352 sf of additional impact to the ocean bottom. Permanent impacts to Land Under the Ocean are tabulated below.

System Component	# of Blocks or Pads	SF/Block or Pad	SF LUO Impact
Intake Lines	70	15.33	1,073
Discharge Lines	40	15.33	613
Intake Structure Pads	2	176	352
Total	110 blocks, 2 pads	-	2,038

As part of the project NU proposes to remove the existing and abandoned intake lines and their anchor blocks, which total approximately 175 sf in area.

2. How will they be installed?
The installation of the seawater intake and discharge lines is anticipated to occur as follows. Throughout the installation it will be essential to protect the integrity of the existing seawater system, which will continue to be used until the new system is operational.

In-water work to install the seawater intake and discharge lines is proposed to occur in July-August 2020, within the Time of Year work window for Winter Flounder and when the weather is generally favorable. To minimize disruption to the marine benthic environment, the 2 proposed 14" diameter intake pipes and 2 proposed 16" diameter seawater discharge pipes will be assembled on land by heat welding 20 ft long sections of HDPE pipe together. After installing siltation controls to protect wetland resource areas, upland trenching towards the seawall will commence. When excavating the pipe trenches, excavated material will be deposited on the uphill side of the trench using smallest excavation machine possible to minimize disruption. The contractor will excavate the pipe trench only if favorable weather is anticipated. Once the pipe trench excavation is complete, the trench will be bedded with 12" of clean washed compacted sand and the pipe laid on top of the compacted sand bed.

As the pipe trench approaches the seawall, a directional drilling contractor will excavate a work pit for their drilling equipment and then directionally drill under the seawall and beach following the slope of the beach. The bore will terminate at a location seaward of the lowest low water elevation.

The contractor will cap both ends of the intake and discharge pipes, trapping air within the pipes. A cable will be secured to the head of the pipes and an offshore vessel will pull the pipes through the trench, through the directional bore and then offshore. With the pipes full of air they will float and can be positioned over their proposed locations. The pipes will then be temporarily moored using weighted anchors and cables. The upland trenches will then be backfilled with clean washed sand followed by clean dense grade material to prevent them from floating up in the trench should a rainstorm suddenly occur. Where applicable, the backfilled trenches will be loamed and seeded with a conservation mix.

The marine contractor will then begin attaching concrete ballasts blocks onto the pipes using an offshore marine barge outfitted with a crane. The barge will be held in position using either spuds or mooring anchors during the installation of the ballast blocks. The marine contractor will slowly release the air from the pipes to allow the HDPE pipes to sink to the bottom as the concrete ballasts are attached.

Marine commercial divers will assess the bottom conditions beneath each concrete pipe ballast location and will advise the marine contractors to attach either a hot-dipped galvanized helix anchor set or stainless steel rods to each concrete pipe ballast, depending on the bottom conditions, before it is attached to the pipe and lowered to the bottom. Helix anchors will be used if there is sufficient sediment present below the concrete ballast location. The helix anchors will be driven into the sediment with equipment carried by the divers or from rigs on the barge. If the concrete ballast will be place on top of bedrock, stainless rods will be used in conjunction with the ballast blocks. The diver will first position the concrete ballast on the bedrock and then drill holes 4 ft into the bedrock using specialize underwater rock drills. The stainless steel rods will be epoxied into the bedrock for pullout resistance.

At the outmost terminus of the intake piping, the marine contractor will install the two 22’ ft x 8’ precast seawater intake pads by placing the marine barge over the seawater intake sites. The precast intake pads will be pre-piped before being set on the barge. The last section of the 14” HDPE pipe will be flanged and bolted onto the pre-cast piping system and lowered into position on the bottom using the barge crane and guided by the dive team. Since the water is relatively deep at the intake site, the water is less dynamic and the weight of the pre-cast structure alone will keep it in place.

The new HDPE seawater piping system will then be temporarily capped underwater to prevent any biofouling from occurring while the upland piping connections to the pump house are completed. Once completed, the seawater intake screens will be installed by the marine contractor using a dive team to mechanically fasten them to the PVC pipe system on the pre-cast pad.

Once the new seawater system has been fully commissioned, the older existing seawater intake systems will be completely removed by the marine contractor using a dive team and crane to lift the old concrete ballast blocks, mechanical pipe fasteners, intake pipes, and the concrete seawater intakes.

3. Will a 401 Water Quality Certificate be required for installation of new system/removal of old system?

Because the project will require an Order of Conditions and will result in the loss of less than 5,000 square feet cumulatively of bordering and isolated vegetated wetlands and land under water the work is believed to qualify as an “Activity Not Requiring an Application” under 314 CMR 9.03(1).

Attached: Reference Photographs

Typical biofouling blocking flow in a seawater pipe.

HDPE pipe floating prior to installation.

Concrete ballast blocks to secure HDPE pipe to bottom.

Seawater intake pre-cast pad

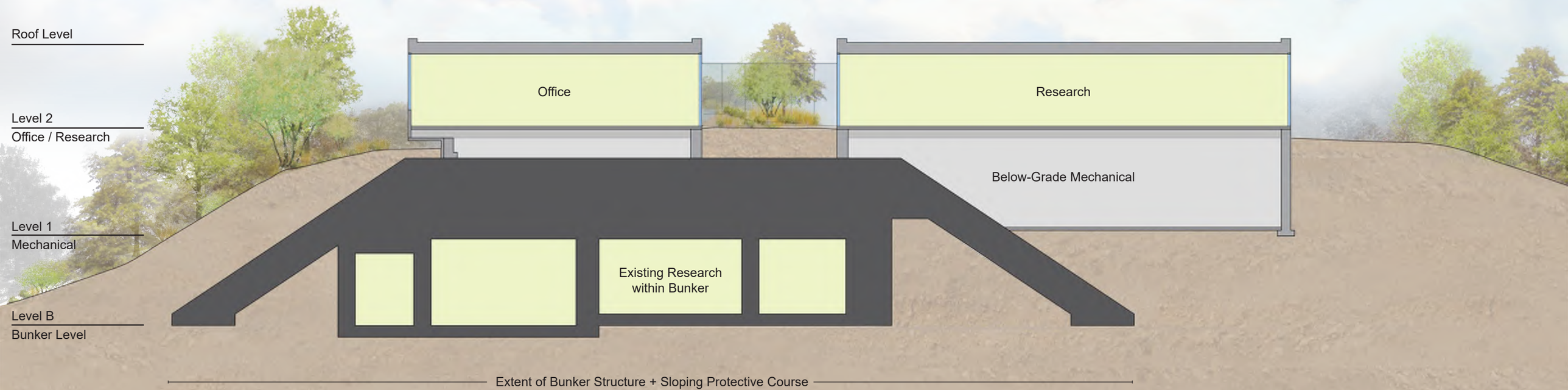
6. Identify historical structures on site and talk about MHC review process if the project is/is not determined to have an adverse effect.

Narrative:
The Massachusetts Historical Commission (MHC) has inventoried the Fort Ruckman North Battery and South Battery (North and South Gunports) in the Massachusetts Cultural Resource Information System (MACRIS). These structures are not designated in any Historical Registers and there are no preservation restrictions. A Project Notification Form (PNF) has been submitted to MHC.

The attached additional information was provided to the MHC upon request.

Northeastern University | Coastal Sustainability Institute
June 21, 2019

Site Plan
Not to Scale



Northeastern University | Coastal Sustainability Institute
June 21, 2019

E-W Transverse Section
Not to Scale

1 No work proposed at this location

2 No work proposed at this location

Existing air handling equipment serving bunker to remain.

3

A Removal of existing electrical feed and emergency power

B Replacement of existing entrance doors and storefront system

C Dashed line represents extent of new rain screen facade and canopy over existing concrete.

4

A Loading dock door to be replaced in kind.

B Service door to be replaced in kind.

C Existing ductwork serving bunker to remain.

5

A Dashed line represents approximate finish grade at serivce yard.

B Existing CMU wall to be demolished to provide access to new program space buried below service yard.

C Existing concrete bunker structure to remain as-is where visible above grade.

7. Article 97 land / Natural Resources district. Include table that identifies allowed uses within this zoning district per the Town.

Narrative:
No portion of the project site is protected under Article 97.

The project site is zoned as a Natural Resource (NR) District. The description of Use is identified as "Non-profit religious or educational purposes". The Nahant zoning bylaws allow this use per the attached table:

TABLE 1

TABLE OF USE REGULATIONS

Description of Use	Zoning Districts: R-1	R-2	B-1	B-2	NR	P
Single-family detached dwelling	P	P	P	P	N	P
Non-profit religious or educational purposes (see definition)	P	P	P	P	P	P

Zoning Districts:

R-1	Residential R-1
R-2	Residential R-2
B-1	Business B-1
B-2	Business B-2
NR	Natural Resource
P	Public

Legend:

P	Permitted Use
N	Not a Permitted Use
S	Special Permit Required

8. Max capacity of the seawater system

Narrative:
The operational flow rate is referenced in the original ENF filing in multiple locations.

The maximum operational capacity is 600 GPM.

The following is taken from Page 1 of Section 3 – Project Narrative:

In addition to incorporating the CSI project, program modifications and refinements that have been made since the 2018 ENF include:

- Reducing the proposed seawater intake flow rate from 2,400 gallons per minute (gpm) to 600 gpm.
- Eliminating the proposal to utilize a portion of the proposed seawater flow to indirectly cool or heat the new CSI building.
- Modifying the previously proposed seawater outfall system through the Bathing Beach seawall to eliminate beach erosion. The current proposal is for an offshore underwater outfall diffuser system that will reduce environmental impacts.
- Eliminating a temporary Bordering Vegetated Wetland disturbance for seawater piping.
- Proposing to construct an onsite lobster hatchery to release Stage IV lobster larvae into the source water as mitigation for potential lobster larvae mortality due to the proposed seawater intakes.

9. Response to CZM e-mail dated 6/26/19

Narrative:
The Following response was submitted to Kathryn Glenn from Coastal Zone Management in response to her questions submitted via email on June 26, 2019.

MacKay, Tim

From: MacKay, Tim
Sent: Friday, July 5, 2019 1:48 PM
To: Flaherty, Erin (ENV); Glenn, Kathryn (ENV)
Cc: Briscoe Lang
Subject: FW: NEU Coastal Sustainability Institute ENF
Attachments: 12125-Resource Area Figure.pdf; 12125-Outfall Location Markup.pdf

Erin / Kathryn,
Please see response below in Red with additional material attached. This information will be included in our July 9 supplemental memo.

Please let me know if you have any questions or concerns.

Thanks,

From: Flaherty, Erin (ENV) <erin.flaherty@state.ma.us>
Sent: Wednesday, June 26, 2019 4:13 PM
To: blang@parecorp.com; MacKay, Tim <t.mackay@northeastern.edu>
Subject: Fwd: NEU Coastal Sustainability Institute ENF

Hi Tim and Briscoe - see questions below from CZM

Get Outlook for iOS

From: Glenn, Kathryn (EEA) <kathryn.glenn@mass.gov>

Sent: Wednesday, June 26, 2019 4:04 PM

To: Flaherty, Erin (EEA)

Cc: Boeri, Robert (EEA)

Subject: NEU Coastal Sustainability Institute ENF

Hi Erin--Based on our review of the ENF, I have a few questions that I am hoping the proponent can address during MEPA review:

- It appears that the flood zones depicted on FEMA's National Flood Hazard Layer have been transfered directly onto the project plans as an overlay. These should be properly located onto the plans; V zones should be scaled; A zones should be depicted based on elevation. This will change the delineation of the Land Subject to Coastal Storm Flowage, so it is important to understanding how (and how much) the project impacts this resource area;

All of the FEMA flood zones shown on the existing conditions plan are overlaid on the site by rectifying the projections of the NFHL data and the survey drawing. This method matches the description of option 1 under Delineating the V Zone/ A Zone Boundary in the "Apply the Massachusetts Coastal Wetlands Regulations" prepared by CZM and MassDEP.

- A site plan depicting all resource areas (including updated floodplain boundaries) and the proposed project would be very helpful in understanding the overall impacts of the project;

Nitsch Engineering has created a figure (attached) which highlights the resource areas included in the existing conditions plans and also highlights the Elevation 13 which is the Flood Elevation described in the Flood Insurance Study prepared by FEMA. Nitsch will consider this area to be Land Subject to Coastal Storm Flowage and has designed the site accordingly.

- It is challenging to see where the outfalls for the stormwater management system are. The stormwater report discusses four outfalls, but I wasn't able to readily locate these on the plan.

  There are four design points located onsite. See below for a description of the outfalls to each design point:

  - Design Point 1 is the Bordering Vegetated Wetland onsite. The BVW collects stormwater runoff through overland flow and also from an outfall that is called out in red on the PDF labeled "Outfall Location Figure."
  - Design Point 2 is the Southern Property Boundary which discharges to the Atlantic Ocean. A majority of the stormwater runoff that reaches Design Point 2 is through overland flow but there is also an outfall from the BVW (DP-1) that discharges to DP-2. This outfall is called out in red on the PDF labeled "Outfall Location Figure."
  - Design Point 3 is the Northern Property boundary which discharges to Nahant Bay and ultimately the Atlantic Ocean. DP-3 receives stormwater runoff through overland flow and from an outfall that is called out in red on the PDF labeled "Outfall Location Figure."
  - Design Point 4 is the Atlantic Ocean and receives stormwater runoff only through overland flow with no specific outfall location.

Please see attached plan for additional information.

- The narrative says that the intake and outfall pipes will be directionally drilled beneath the existing seawall, and the associated plans (SW-03 and SW-04 show the pipes running under the beach and seawall in cross-section. However, the Site Utility Plan (C-401) has a plan note that the seawall will have core holes through it for the seawater supply lines, and that the walkway on top of the seawall will be restored after these are installed. This should be clarified.

The intake and outfall lines will be directionally drilled at approximate elevations shown in sections on SW-03 and SW-04. We do not expect to impact the wall at that depth, however, the note was intended to illustrate that we will core through that section of the site, and not deconstruct / reconstruct the wall for installation. The reference about restoring was intended to show that we do not plan on altering this area from the existing conditions. We can amend these notes in the permit set to provide clarity.

- It will be helpful to have details of the directional drilling operation; where will it be initiated on the site?

The intention will be to initiate the drilling at the location of the new seawater effluent chamber illustrated on SW-01. The pipes will "daylight" – or emerge from underground - 10 feet below mean low tide where they will be installed on the seafloor to their terminus anchored with ballast blocks. Remaining details of the operation are largely based on site/soil conditions.

- At the meeting on Monday, an audience member asked about safeguards for working with invasive species, and a NEU representative stated that they have very specific and strict protocols in place to assure that inadvertent releases of these organisms or chemicals do not occur; CZM would like to have a copy of this protocol to review as part of the review process;

A copy of the Marine Science Center's Best Practices for Seawater Use was distributed to you under a separate heading on 6/28.

- There are new utilities (W andS) proposed to be run under Nahant Road; this area is in a V zone, so these utilities will be at risk; how are these proposed to be protected?

  The civil engineer proposes to use two check valves on both the sanitary sewer and water services that would allow the sections of the utilities within the velocity zone to be isolated in the case of failure.

It will be very helpful if we can have additional information on these items during the MEPA review process.

Thanks so much.

Kathryn

Kathryn Glenn North Shore Regional Coordinator Massachusetts Office of Coastal Zone Management 2 State Fish Pier Gloucester, MA 01930 tel: 978-281-3972 fax: 978-281-8979 kathryn.glenn@state.ma.us

Best Practices for Seawater Use: Northeastern University Marine Science Center

Goals

The goal of the Marine Science Center (MSC) at Northeastern University is to alter the discharge of seawater as little as possible, so that the seawater returned to the ocean is close to ambient conditions. The seawater that is ultimately returned to the ocean from the MSC is influenced by the diverse uses of individual Principal Investigators (PIs) and their labs. This "Best Practices" document provides a guide for PIs and their students on how to safely return the seawater from their tanks or arrays to the ocean. The goal of the Seawater Advisory Committee (SAC) is to maintain and update this document, and to provide a reporting system for seawater use from individual labs.

Here, the term "return seawater" refers to seawater that is returned from a local array of tanks or seatables, not the entire discharge of the MSC. Because of the diverse experiments done at the MSC, PIs may have different requirements for processing return seawater at different times. These requirements may vary depending on the conditions of the experiment and the species that are kept in tanks.

Filtration of return seawater from individual labs

Filtration of seawater removes biomass (e.g., phytoplankton), particulate matter and suspended sediments. For this reason, return seawater should only be filtered if required (see below). If filtration is required for the return seawater, we recommend a mechanical filter (e.g. 5-50 um) and UV filtration. Ozone should be avoided because it leaves chemical residues in the seawater. If ozone is required, please consult with the SAC before implementing.

How to determine if return seawater requires filtration

Our coastlines already have many locally established invasive species. SAC does not require seawater filtration for species that are collected on Nahant. When applying for a collection permit from Massachusetts Department of Marine Fisheries (MA-DMF), PIs must specify in their permit description whether return seawater will be filtered and if so, how. Doing so will allow MA-DMF to review the plan and make recommendations. If housing a species that was collected under a different permit (other than MA-DMF), please correspond with the relevant agencies to learn the requirements for transporting the species across state borders and ask if seawater filtration is recommended. If collecting outside of the biogeographic region from Long Island to the Canadian border, seawater filtration is required.

Returning animals to the wild

Under no circumstances should animals be released on Nahant if they were not collected here. If specimens were collected from locations other than in Nahant and the PI wants to return them to their site of origin, note that MA-DMF has some concerns about returning animals to the wild once they have been exposed to water from a different location. The SAC recommends that the PI contacts MA-DMF and follows their

recommendation on whether or not animals should be returned to their site of origin or disposed of in an appropriate landside disposal system (solid waste or wastewater treatment).

Freshwater use

The freshwater supplied to the MSC is municipal freshwater. It is permissible to use small amounts of municipal freshwater to rinse tanks. If PIs have concerns about trace amounts of municipal freshwater in their tanks and/or glassware (for example in experiments with marine larvae), it is recommended to use a carbon filter (see Lotterhos lab example in bunker), reverse osmosis (see OGL), or letting the water offgas for 24 hours. SAC does do not recommend using municipal freshwater to control salinity in experiments.

Copper

Copper paint is sometimes used in experiments to keep out herbivores. Copper is considered pollution. Copper is not permitted in the seawater system at the MSC.

Submerged Sump Pumps

The SAC does not recommend using sump pumps that contain oil. If these break, they could be a source of oil in the MSC seawater system. The SAC recommends the use of sump pumps that work with water.

Antibiotics, cleaning agents, other hazardous chemicals and Invasive/non-native species

All hazardous chemicals used at MSC must be used in compliance with all occupational health, safety, and environmental rules and regulations. Contact the Office of Environmental Health and Safety (EHS) for information on disposal of chemicals and hazardous waste. In no cases should antibiotics, cleaners, or hazardous chemicals be disposed of in the seawater discharge. Species that are not found in Massachusetts Bay will be observed/experimented on in off-line tanks and will be ultimately be disposed of in an appropriate landside disposal system (solid waste or wastewater treatment). Northeastern University will seek guidance from the Massachusetts Invasive Species Program (MISP) prior to implementing research that requires the use of species not present in Massachusetts Bay.

Emergency Chemical Spill Response Plan

Each PI is required to have an Emergency Spill Response Plan on file with the SAC. The plan should explain how a chemical spill would be contained, if one were to occur in a tank that drains to the ocean. The plan should contain specific instructions for turning off inflow, isolating the affected area, and containing the spill. Each PI is responsible to make sure all lab personnel know the emergency spill response plan. If a spill were to occur, please contain it and contact the MSC Facilities Manager (Ryan Hill) immediately. The Facilities Manager will work with Environmental Health and Safety and Clean Harbors to make sure that the spill is appropriately handled and disposed of.

Tank labeling system
Every array of tanks or seatables should have a label with the following information:
1) Person leading the experiment and contact information
2) PI or Lab and contact information
3) Species kept in tank(s)
4) Date of approval from SAC
5) SAC Plan ID
6) Seawater: (ambient) OR (other - please describe)
7) Active dates

Reporting seawater use
For each separate project requiring seawater use, PIs are required to submit a "Seawater Plan Form" at a deadline given by the committee, and "Seawater Report Form" one month following project completion. There is also an Addendum for reporting minor changes to a Plan.

Save the Spill Response Plan as: PILastName_SpillResponsePlan_YYYYMMDD

Save the Seawater Plan as: PILastName_ProjectShortName_Plan_YYYYMMDDstart-YYYYMMDDend
- Save the Addendum as PILastName_ProjectShortName_Plan_YYYYMMDDstart-YYYYMMDDend_Addendum

Save the Seawater Report as: PILastName_ProjectShortName_Report_YYYYMMDDend

A plan can be submitted that cover multiple years of a project (up to 5 years). The report is due once at the end of the project, as well as every semester that there is an event that happens outside the parameters outlined in the Seawater Plan.

Deadlines

Seawater usage time	**Plan due**	**Report due**
May 1 - Aug 31	**April 1**	**Dec 1**
Sept 1 - Dec 31	**Sept 1**	**April 1**
Jan 1 - May 1	**Dec 1**	**Sept 1**

Emergency Chemical Spill Response Plan

Explain how a chemical spill would be contained, if one were to occur in a tank that drains to the ocean. The plan should contain specific instructions with pictures for turning off inflow, isolating the affected area, and containing the spill.

PI _____

Tank array location _____

Plan:

Internal Use
SAC Plan ID _____

Date approved _____

Seawater Plan form

In this form, "local discharge" refers to the discharge resulting from a small seawater array used to house animals or perform experiments, and not the entire system.

Name:

Date:

PI Name:

Project Name:

Planned GPM of local discharge:

Species (Common and scientific names):

If experiment involves vertebrates, AUP approval information:

Planned Location(s) of collections:

Number of individuals of each species to be kept in seawater arrays at NUMSC:

Planned location(s) of seawater arrays where animals are to be kept:

Plan for feeding species:

Return seawater will be filtered: Yes/No

If yes: Please describe how the return seawater will be filtered that was housed with these species:

For the following categories, please indicate the planned parameters over the course of the experiment. If the parameter will not experimentally manipulated state "not altered":

Planned Mean salinity of local discharge (ppt):

Planned Mean pH of local discharge:

Planned Mean temperature of local discharge (F):

Planned Mean dissolved oxygen of local discharge:

Planned filtration and UV treatment of local discharge (if none than "not treated"). Please be specific (size and number of filters, filter ratings for flow rate).

If UV treatment is planned, describe a plan to limit UV exposure to eyes and skin (if not applicable put "N/A":

Describe any planned use of chemicals or antibiotics in the experimental tanks and a plan for how the water will be disposed.

Please answer the following questions about the local discharge. If the parameter will be unaltered, put "N". If the answer to any of these questions is "Y," please provide details.

Will the bacteria biomass of the local discharge be greater than natural intake conditions? Y/N

Will the suspended solids of the local discharge be greater than natural intake conditions? Y/N

Will the effluent color and/or turbidity of the local discharge be different than natural intake conditions? Y/N

Any use of oil or grease? Y/N

Will the local discharge have any change in taste or odor relative to natural intake conditions? Y/N

Describe the plan for disposing of specimens or returning them to the wild at the end of the experiment:

Signature _____ Date _____

PI Signature _____ Date _____

Internal Use

Date approved _____

Seawater Plan Addendum form

Use this form to describe minor changes to a previously approved SAC plan.

SAC Plan ID _____

Additional changes:

Internal Use

Date approved _____

Seawater Report form

In this form, "local discharge" refers to the discharge resulting from a small seawater array used to house animals or perform experiments, and not the entire system.

SAC Plan ID:

Date:

Name:

PI Name:

Project Name:

Actual mean GPM of local discharge:

Species (Common and scientific names) and AUP if applicable:

Location(s) of collections:

Actual number of individuals kept in seawater arrays at NUMSC:

Actual locations of seawater arrays where animals were kept:

For the following categories, please indicate the average parameters over the course of the experiment. If the parameter was not experimentally manipulated state "not altered":

Mean salinity of local discharge (ppt):

Mean pH of local discharge:

Mean temperature of local discharge (F):

Mean dissolved oxygen of local discharge:

Describe filtration and UV treatment of local discharge (if none than "not treated"):

Describe any use of chemicals or antibiotics in the experimental tanks and how the water was treated or disposed.

Describe any other instances over the course of the experiment that resulted in the local discharge being outside of ambient or experimental conditions.

Please answer the following questions about the local discharge. If the parameter was unaltered, put "N". If the answer to any of these questions is "Y," please provide details.

Was bacteria biomass of the local discharge greater than natural intake conditions? Y/N

Were the suspended solids of the local discharge greater than natural intake conditions? Y/N

Was the effluent color and/or turbidity of the local discharge different than natural intake conditions? Y/N

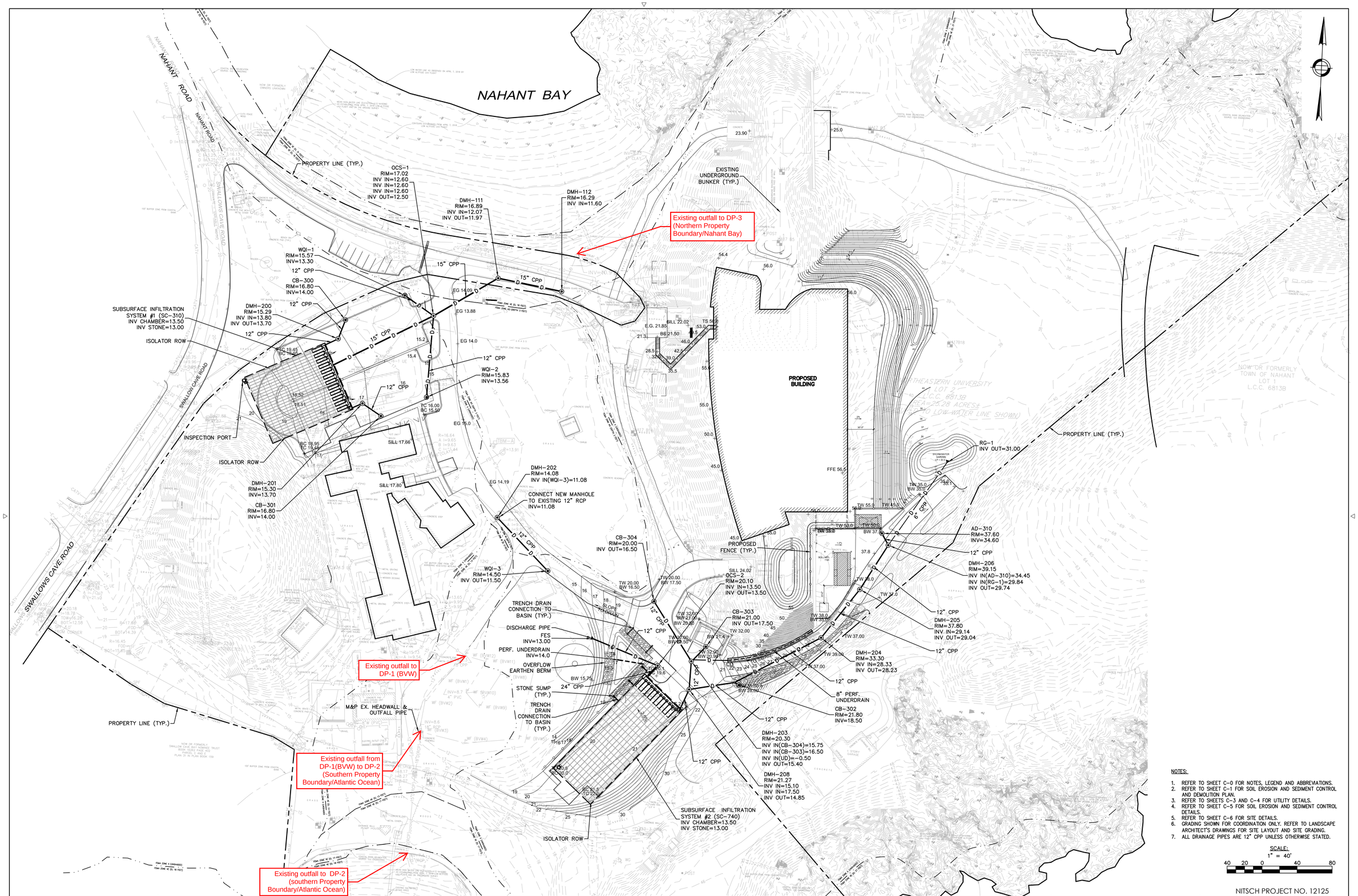
Any use of oil or grease? Y/N

Was the taste or odor of the local discharge different from natural intake conditions? Y/N

Describe how specimens were disposed or returned to the wild at the end of the experiment:

Signature _____ Date _____

PI Signature _____ Date _____



NOTES:

1. REFER TO SHEET C-0 FOR NOTES, LEGEND AND ABBREVIATIONS.
2. REFER TO SHEET C-1 FOR SOIL EROSION AND SEDIMENT CONTROL AND DEMOLITION PLAN.
3. REFER TO SHEETS C-3 AND C-4 FOR UTILITY DETAILS.
4. REFER TO SHEET C-5 FOR SOIL EROSION AND SEDIMENT CONTROL DETAILS.
5. REFER TO SHEET C-6 FOR SITE DETAILS.
6. GRADING SHOWN FOR COORDINATION ONLY. REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR SITE LAYOUT AND SITE GRADING.
7. ALL DRAINAGE PIPES ARE 12" CPP UNLESS OTHERWSE STATED.

SCALE:
1" = 40'
40 20 0 40 80

NITSCH PROJECT NO. 12125

Architect

Payette Associates Inc.
290 Congress Street, Fifth Floor
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MEP Engineer

Bard, Rao + Athanas Consulting Engineers, LLC
10 Guest St
Boston, MA 02135
Tel: 617-254-0016

Structural Engineer

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Tel: 781-907-9000

PAYETTE

Issues

Number	Date	Description
01	04/01/19	WPA Notice of Intent Submission

Revisions

Number	Date	Description

NORTHEASTERN UNIVERSITY COASTAL SUSTAINABILITY INSTITUTE

Drawing Scale
AS NOTED

Project Number
45270.00

Date Issued
APRIL 1, 2019

OUTFALL LOCATION FIGURE

DR-4

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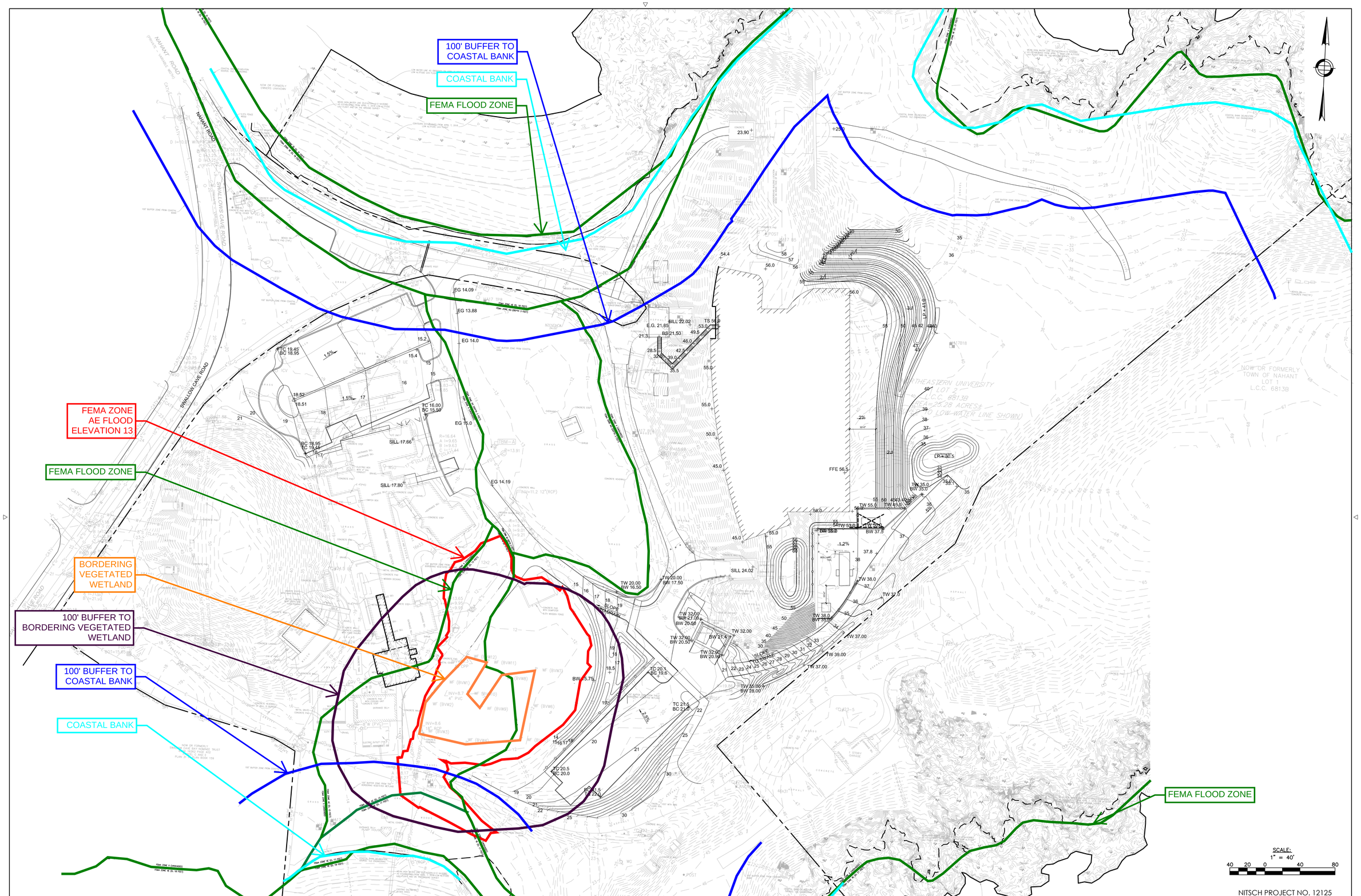

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PAYETTE

Issues

Number	Date	Description
01	05/03/19	SCHEMATIC DESIGN
02	07/01/19	DRAFT NOI SUBMISSION

Revisions

Number	Date	Description

NORTHEASTERN UNIVERSITY COASTAL SUSTAINABILITY INSTITUTE

Drawing Scale
AS NOTED

Project Number
45270.00

Date Issued
MAY 3, 2019

SK-1

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Attachment 1:

June 25, 2019 email to MEPA responding to questions related to programming and seawater testing. See Items 1 and 4 for additional information.

MacKay, Tim

From: MacKay, Tim
Sent: Wednesday, June 26, 2019 1:31 PM
To: Flaherty, Erin (ENV)
Cc: Briscoe Lang
Subject: FW: thresholds
Attachments: Northeastern University Response Questions_January_31_2019.pdf; April 8 Test Results.pdf; April 11 Test Results.pdf; 19_0515-Presentation_low res.pdf

Hi Erin,
Please see our response in Red.

I will be calling you momentarily to review.

Thanks,
Tim

From: Flaherty, Erin (ENV) <erin.flaherty@state.ma.us>
Sent: Tuesday, June 25, 2019 12:19 PM
To: MacKay, Tim <t.mackay@northeastern.edu>; Briscoe Lang <blang@parecorp.com>
Subject: RE: thresholds

Hi Tim and Briscoe –

I do need a few clarifications:

1. Can you provide additional details on programming of the proposed CSI building? For example, how many sf will be used for office/research/mechanical. This would be helpful to better understand the justification for the size of the building and why a reduced build alternative was not included in the alternatives analysis.

Please see the January 2019 responses to the questions posed by residents. Additionally, we have included graphics illustrating the Net sqft v. Gross sqft breakdown (in the 05/15 presentation). The ratio is much higher here given our attempt to internalize almost all mechanical equipment, ductwork and ventilation shafts.

2. I couldn't find the Land Use Codes that the trip numbers were based on in the preliminary traffic analysis. Is that in the ENF?

We did not use land use codes to estimate traffic volume. The traffic counts were based on actual vehicular traffic recordings at the causeway, Nahant Town Hall, and the Marine Science Center Gates. Both studies revealed that MSC traffic represents about 2% of total traffic coming into Nahant (2.4% in October, 1.9% in June). In comparison, more than double that volume travel past the MSC gates onto Swallow Cave Rd, and about triple the volume travel to the golf course / wedding venue during their off-peak times (Mon/Tues).

3. Did the proponent consider any alternatives to installing the utilities within Nahant Road due to its proximity to Canoe beach? If not, why?

During conceptual planning, a secondary/alternative entrance driveway to the campus was considered south of the Edwards Bunker at the Vernon St. Intersection of Swallow Cave Rd. – with utilities installed underneath. That road was

removed very early on due to community concerns from the more vocal opponents regarding traffic continuing down Swallow Cave Rd. with associated noise, light and screening concerns.

4. From a safety /planning perspective it does not make a lot of sense to build the CSI without addressing the flooding at the only access road. Can you confirm that there are no current plans to improve and/or armor the coastal bank at this location?

There are no immediate plans to improve and/or armor the coastal bank at this location. After the 2016 project – which was a solution directed and agreed upon by Nahant Conservation Commission, Coastal Zone Management and the DEP, NU had received a grant to further study baseline vegetation, sediment properties, and subtidal bivalve communities on the beach to evaluate a potential mixed sediment dune and beach nourishment project with green infrastructure. Any solution pursued will be under the guidance and approval of CZM/DEP/Nahant Cons Com.

5. Can you provide additional details on NPDES permitting of the seawater system? i.e. why could the system potentially require a NPDES permit, what circumstances would preclude it from requiring a discharge permit? Who have you been working with at EPA/MassDEP on this?

Over the last 18 months, we have worked closely with the DEP/EPA to determine the effects of our existing and proposed systems on the marine habitats. I have attached here conventional pollutant testing conducted by a third party agency requested by the EPA. The results fall below the NPDES effluent limitations – most even falling Below Recordable Limits (BRL). The DEP/EPA determined this project does not require a NPDES permit. We have been collaborating with Cathy Vakalopoulos (DEP) and Danielle Gaito (EPA). I believe they intend to provide comment in support of the project to MEPA prior to the close of the comment period.

6. It would be helpful to have a figure that identifies wetland resource areas with an overlay of the building footprint and other proposed disturbance along with a table that identifies impacts associated with each project component. I'm still confused about what resource areas (including buffer zones), if any, are impacted by the building footprint.

We have included this graphic in the attached presentation (slide 7).

7. Clarify what is considered existing impervious area and what will be considered new impervious area?

Existing impervious areas include all above ground structures, roadways and paved parking areas. Subsurface bunkers are not included in that calculation. The new impervious areas primarily include the footprints of the CSI and pumphouse additions, parking lots, and the fire department access road. We are currently exploring ways to reduce this area further including the potential of utilizing a green roof system. Across the 20.4 acre site, we currently calculate 2.4 acres of impervious area. The current plan would add 1.3 acres of impervious area.

8. Can you confirm that any land within the development footprint is not protected by Article 97? And that none of the thresholds at 11.03(1)(b) are exceeded?

Confirmed – no land in the development area is protected by Article 97. We are also not exceeding thresholds outlined in 11.03(1)(b).

9. There seems to be confusion regarding the potential impacts to the Town's easement to access East Point. Can you confirm that this will stay accessible during the construction period?

As a legal (deeded) Right of Way, NU has an obligation to maintain access to East Point – both for pedestrian as well as Nahant DPW traffic. This will remain accessible throughout the construction process.

Thank you!

Erin Flaherty
MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

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